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UNITED STATES AIR FORCE
IERA

1999 Air Emissions Inventory for Malstrom Air Force Base, Montana

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1310 Kemper Meadow Drive
Cincinnati, OH 45240

October 2000

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Contractor conducted a comprehensive air emissions inventory (AEI) for calendar year 1999 at Malstrom AFB, MT. The intent was to provide a representative emission estimate. Actual and potential emissions were estimated for regulated pollutants. Emissions for each source were determined using the guidance provided in "Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations," May 1999.

AEI indicates that potential emissions from stationary sources exceed the major threshold of 100 tons per year of criteria pollutants, and potential emissions are below the major threshold of 10 tons per year of any single HAP and 25 tons per year of total HAPs.

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Air Emissions Inventory, Hazardous Air Pollutant, Volatile Organic Compounds, Particulate Matter, Carbon Monoxide, Sulfur Dioxide, Oxides of Nitrogen, National Ambient Air Quality Standards,

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ABBREVIATIONS AND ACRONYMS

A	amp(s)
AAFES	Army and Air Force Exchange Service
ACC	Air Combat Command
AEAR	Air Emissions Assessment Report
AEI	Air Emission Inventory
AFB	Air Force Base
AFS	AIRS Facility Subsystem
AFSPC	Air Force Space Command
AGSE	aerospace ground support equipment (historically referred to as AGE)
AIRS	Aerometric Information Retrieval System
APCD	Air Pollution Control District
APU	Auxiliary Power Unit
AST	aboveground storage tank
BACT	Best Available Control Technology
BEE	Bioenvironmental Engineer
BSFC	brake-specific fuel consumption
Btu	British thermal unit
BX	Commercial gasoline station
BOOS	burners out of service
°C	degrees Celsius
CAA	Clean Air Act
CAAA-90	Clean Air Act Amendments of 1990
CES	Civil Engineer Squadron
CFC	chlorofluorocarbon
CFM	cubic feet per minute
CFR	Code of Federal Regulations
CHP	Central Heating Plant
CI	compression ignition
CNG	compressed natural gas
CO	carbon monoxide
Cr	chromium
Cr^{+6}	hexavalent chromium
CTG	control techniques guideline
CY	calendar year
Det 1, HSC	Detachment 1, Human Systems Center
DF	diesel fuel

ABBREVIATIONS AND ACRONYMS (continued)

DLA	Defense Logistics Agency
DoD	Department of Defense
DTIC	Defense Technical Information Center
EA	environmental assessment
EF	emission factor
EIS	environmental impact statement
EO	ethylene oxide
EOD	explosive ordnance disposal
EQ	Environmental Quality Management, Inc.
ESP	electrostatic precipitator
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
°F	degrees Fahrenheit
FBC	fluidized bed combustor
FCAW	flux cored arc welding
FF	fabric filter
FGD	flue gas desulfurization
FGR	flue gas recirculation
FIRE	Factor Information Retrieval System
FR	Federal Register
ft^2	square feet
ft^3	cubic feet
g	gram(s)
gal	gallon(s)
GACT	Generally Available Control Technology
GMAW	gas metal arc welding
GOCO	government owned-contractor operated
GOV	government-owned vehicle(s)
GSA	General Services Agency
HAP	hazardous air pollutant
HAZMART	Hazardous Materials Pharmacy
HAZMAT	Hazardous Materials
HCFC	hydrochlorofluorocarbon(s)
HCl	hydrochloric acid
HF	hydrogen fluoride
Hg	mercury
HMIS	Hazardous Material Information System
hp	horsepower
hr	hour(s)

ABBREVIATIONS AND ACRONYMS (continued)

HVAC	heating, ventilation, and air conditioning
HVLP	high volume/low pressure
IC	internal combustion
ID	identification
IRP	Installation Restoration Program
°K	degrees Kelvin
kg	kilogram(s)
kW	kilowatt(s)
lb	pound(s)
L	liter
LAER	Lowest Achievable Emission Rate
LEA	low excess air
LNB	low NO_x burner(s)
LPG	liquefied petroleum gas
MACT	Maximum Achievable Control Technology
MAFB	Malmstrom Air Force Base
MAJCOM	Major Command
MEK	methyl ethyl ketone
MEM	mass of energetic material
mg	milligram
MIDAS	Munitions Items Disposition Action System
min	minute(s)
ml	milliliter
mm	millimeter
MMBtu	million British thermal units
MOGAS	motor gasoline
MSDS	material safety data sheet(s)
MSW	municipal solid waste
MT	Montana
MW	molecular weight
MWC	municipal waste combustor
MWI	medical waste incinerator
NAAQS	National Ambient Air Quality Standard(s)
NACA	National Advisory Committee for Aeronautics
NASA	National Aeronautics and Space Administration
NESHAP	National Emission Standards for Hazardous Air Pollutants
NEW	net explosive weight
NMOC	nonmethane organic compound(s)
No.	number
NO	nitric oxide
NO_2	nitrogen dioxide

ABBREVIATIONS AND ACRONYMS (continued)

NO_x	oxides of nitrogen (or nitrogen oxides)
NOV	Notice of Violation
NSN	national stock number
NSPS	New Source Performance Standards
NSR	New Source Review
NTE	Not to Exceed
NTIS	National Technical Information Service
O_3	ozone
OA	opportunity assessment
OB	open burning
OD	open detonation
ODP	ozone depletion potential
ODS	ozone depleting substance
OEBQ	Occupational and Environmental Health Directorate
OFA	overfire air
P2	pollution prevention
PAH	polycyclic aromatic hydrocarbon(s)
Pb	lead
PC	pulverized coal
PCB	polychlorinated biphenyls
PCDD	polychlorinated dibenzo-p-dioxin(s)
PCDF	polychlorinated dibenzofuran(s)
PCE	perchloroethylene (tetrachloroethylene)
PIC	products of incomplete combustion
PM	particulate matter
$PM_{2.5}$	particulate matter with an aerodynamic diameter less than 2.5 microns
PM_{10}	particulate matter with an aerodynamic diameter less than 10 microns
POL	Petroleum, Oils, and Lubricants
POM	polycyclic organic matter
POTW	Publicly Owned Treatment Works
POV	privately-owned vehicle(s)
ppb	parts per billion
ppm	parts per million
ppt	parts per trillion
PSD	Prevention of Significant Deterioration
psi	pounds per square inch
psia	pounds per square inch, absolute
psig	pressure per square inch, gauge
PSM	point source monitoring
PTE	Potential to Emit
PTO	Permit to Operate

ABBREVIATIONS AND ACRONYMS (continued)

°R	degrees Rankine
RACT	Reasonably Available Control Technology
RVP	Reid Vapor Pressure
SAW	submerged arc welding
SCC	Source Classification Code
scf	standard cubic feet
SCR	selective catalytic reduction
SDA	spray dryer adsorber
SI	spark ignition
SIC	Standard Industrial Classification
SMAW	shielded metal arc welding
SNAP	Significant New Alternatives Policy
SNCR	selective noncatalytic reduction
SO_2	sulfur dioxide
SO_x	oxides of sulfur (or sulfur oxides)
SVE	soil vapor extraction
SVOC	semivolatile organic compound(s)
TAC	Tactical Air Command
TANKS	Storage Tank Emissions Calculation Software
TCDD	tetrachlorodibenzo-p-dioxin(s)
TCDF	tetrachlorodibenzofuran(s)
TDS	total dissolved solids
TNMOC	total nonmethane organic compound(s)
TOC	total organic compound(s)
tpy	ton(s) per year
TSP	total suspended particulate matter
µg	microgram
µl	microliter
USAF	United States Air Force
UST	underground storage tank
VOC	volatile organic compound(s)
wk	week(s)
yr	year(s)

EXECUTIVE SUMMARY

Environmental Quality Management, Inc. (EQ) conducted a comprehensive air emissions inventory (AEI) for calendar year 1999 at Malmstrom AFB, MT. EQ identified regulated air pollution sources within the confines of Malmstrom AFB and estimated the actual and potential emissions for regulated pollutants. The intent of the inventory was to provide a representative emission estimate. The goal of the program was not to determine the applicability of the Title V requirements to each emissions unit at Malmstrom AFB.

The CY1999 inventory included an inventory of regulated air pollutant sources from stationary sources. Actual emission estimates were determined and potential to emit emission estimates were made for all stationary sources. The regulated pollutant target list (provided in Appendix A), for the purpose of this inventory, included pollutants defined under 40 CFR 70.2, particulate matter (PM), sulfur dioxide (SO_2), oxides of nitrogen (NO_x), carbon monoxide (CO), volatile organic compounds (VOC), pollutants for which Title 1 NAAQS has been promulgated, pollutants subject to a standard under the NSPS program, ozone depleting substances regulated under Title VI, hazardous air pollutants (HAPs) subject to standards under CAA Section 112, and substances regulated under the accidental release prevention program under Section 112 (r).

Emission estimates for each source were determined using the guidance provided in the document entitled "Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations" which was developed by Det 1, HSC/OEBQ, May 1999. The guidance document was used as the primary reference for the inventory. Other reference documents were utilized where appropriate to support emission estimation.

Based on the emission inventory, Malmstrom AFB has potential emissions from its stationary sources that exceed the major threshold of 100 tpy for criteria pollutants. The potential emissions of HAPs are below the major source threshold of 10 tpy of any single HAP and the threshold of 25 tpy of total HAPs at the facility. Summaries of the actual and potential emissions for CY1999 at Malmstrom AFB are provided in Tables 1 and 2, respectively. Tables 1 and 2 also provide a summary of the emissions of ozone depleting substances. Conclusions and recommendations based on this are found in Section 1.4 of this document as are detailed summaries of potential and actual HAP emissions.

Table 1.
1999 Air Emission Inventory Pollutant Summary (Actual)
MALMSTROM AFB, MT

Source	PM		PM-10		NOx		SO2		CO		VOC		Lead		Total HAPs		ODS	
Category	tons/yr	% of total	tons/yr	% of total	tons/yr	% of total	tons/yr	% of total	tons/yr	% of total	tons/yr	% of total	tons/yr	% of total	tons/yr	% of total	tons/yr	% of total
Abrasive Blasting	0.47	5.7%	0.40	7.5%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Asphalt Paving	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Classified Document Incinerator	0.0010588	0.0%	0.0007109	0.0%	0.0004538	0.0%	0.0003781	0.0%	0.0015	0.0%	0.0004538	0.0%	0	0.0%	0.0015	0.0%	0	0.0%
Coal Storage/Handling	0.01	0.1%	0.01	0.2%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Equipment Leaks	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0.18	0.8%	0	0.0%	0.022	0.5%	0	0.0%
External Combustion Sources	1.25	15.1%	1.25	23.5%	38.67	87.9%	95.6	99.4%	31.7	94.4%	1.22	5.2%	0.03	79.7%	0.99	24.7%	0	0.0%
Fire Fighter Training	0.02	0.3%	0.02	0.4%	0.13	0.3%	0	0.0%	0.04	0.1%	0.06	0.2%	0	0.0%	0.001645	0.0%	0	0.0%
Fuel Spills	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0.091	0.4%	0	0.0%	0.001	0.0%	0	0.0%
Fuel Storage (Tanks)	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1.34	5.7%	0	0.0%	0.10	2.4%	0	0.0%
Fuel Transfer	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	5.3E-03	0.0%	0	0.0%	5.4E-04	0.0%	0	0.0%
Gasoline Service Stations	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0.74	3.1%	0	0.0%	0.05	1.4%	0	0.0%
Heavy Construction Operations	3.8	46.1%	1.7	32.3%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Landfarm	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	3.51	14.9%	0	0.0%	0.345	8.6%	0	0.0%
Miscellaneous Chemical Use	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	2.41	10.2%	0	0.0%	0.87	21.6%	0	0.0%
Open Detonation of Energetic Materials	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0.003	0.0%	0	0.0%	0.0002	0.5%	0.0002	0.0%	0	0.0%
Ozone Depleting Substances	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0.40	100.0%
Pesticide Application	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0.67	2.8%	0	0.0%	0	0.0%	0	0.0%
Photographic Equipment	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0.03	0.1%	0	0.0%	0	0.0%	0	0.0%
Sanitary Landfill	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	12	50.3%	0	0.0%	1.30	32.4%	0	0.0%
Sheet Metal Shop	0.0042	0.1%	0.0042	0.1%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0.0001664	0.0%	0	0.0%
Site Restoration	0	0.0%	0	0.0%	0	0.0%		0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Small Arms Firing	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0.06	0.2%	0	0.0%	0.0083	19.8%	0.0083	0.2%	0	0.0%
Solvent Cleaning Machines	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0.33	1.4%	0	0.0%	0.003	0.1%	0	0.0%
Stationary Combustion Equipment	0.16	2.0%	0.15	2.8%	3.39	7.7%	0.42	0.4%	0.76	2.3%	0.19	0.8%	0	0.0%	1.84E-03	0.0%	0	0.0%
Sulfuric Acid Batteries Maintenance	0.001	0.0%	0.001	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Surface Coatings	0.0027	0.0%	0.0027	0.1%	0	0.0%	0	0.0%	0	0.0%	0.73	3.1%	0	0.0%	0.29	7.1%	0	0.0%
Vehicle maintenance exhaust	0.15	1.8%	0.15	2.8%	1.82	4.1%	0.15	0.2%	1.01	3.0%	0.18	0.8%	0	0.0%	0.031	0.8%	0	0.0%
Welding	0.03	0.4%	0.03	0.5%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1.08E-03	0.0%	0	0.0%
Wet Cooling Towers	0.094	1.1%	0.094	1.8%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Wood Chipper and Storage	1.35	16.4%	0.58	10.9%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Woodworking	0.91	11.0%	0.91	17.1%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
X-Ray Processing	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0.06	0.2%	0	0.0%	0	0.0%	0	0.0%
Total	8.3	100.0%	5.3	100.0%	44.0	100.0%	96.1	100.0%	33.5	100.0%	23.6	100.0%	0.04	100.0%	4.0	100.0%	0.40	100.0%

Table 2.
1999 Air Emission Inventory Pollutant Summary (Potential)
MALMSTROM AFB, MT

Source	PM		PM-10		NOx		SO2		CO		VOC		Lead		Total HAPs		ODS	
Category	tons/yr	% of total	tons/yr	% of total	tons/yr	% of total	tons/yr	% of total	tons/yr	% of total	tons/yr	% of total	tons/yr	% of total	tons/yr	% of total	tons/yr	% of total
Abrasive Blasting	2.0	2.7%	1.7	2.5%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Asphalt Paving	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Classified Document Incinerator	0.0044	0.0%	0.0030	0.0%	0.0019	0.0%	0.0015881	0.0%	0.0064	0.0%	0.0019	0.0%	0	0.0%	0.0064	0.0%	0	0.0%
Coal Storage/Handling	0.04	0.1%	0.04	0.1%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Equipment Leaks	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0.18	0.4%	0	0.0%	0.022	0.1%	0	0.0%
External Combustion Sources	53.8	72.7%	53.8	78.8%	265.4	78.1%	160.7	95.9%	109.1	85.2%	2.24	4.7%	0.25	87.7%	8.82	54.1%	0	0.0%
Fire Fighter Training	0.09	0.1%	0.09	0.1%	0.55	0.2%	0	0.0%	0.15	0.1%	0.24	0.5%	0	0.0%	0.0069	0.0%	0	0.0%
Fuel Spills	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0.383	0.8%	0	0.0%	0.006	0.0%	0	0.0%
Fuel Storage (Tanks)	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	5.61	11.7%	0	0.0%	0.41	2.5%	0	0.0%
Fuel Transfer	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	7.0E-03	0.0%	0	0.0%	8.9E-04	0.0%	0	0.0%
Gasoline Service Stations	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	3.11	6.5%	0	0.0%	0.23	1.4%	0	0.0%
Heavy Construction Operations	3.8	5.2%	1.7	2.5%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Landfarm	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	3.51	7.3%	0	0.0%	0.35	2.1%	0	0.0%
Miscellaneous Chemical Use	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	10.14	21.1%	0	0.0%	3.71	22.8%	0	0.0%
Open Detonation of Energetic Materials	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0.012	0.0%	0	0.0%	0.0009	0.3%	0.0009	0.0%	0	0.0%
Ozone Depleting Substances	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0.40	100.0%
Pesticide Application	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0.67	1.4%	0	0.0%	0	0.0%	0	0.0%
Photographic Equipment	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0.12	0.2%	0	0.0%	0	0.0%	0	0.0%
Sanitary Landfill	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	11.9	24.7%	0	0.0%	1.30	8.0%	0	0.0%
Sheet Metal Shop	0.0175	0.0%	0.0175	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0.0006989	0.0%	0	0.0%
Site Restoration	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Small Arms Firing	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0.24	0.2%	0	0.0%	0.0347	12.0%	0.0347	0.2%	0	0.0%
Solvent Cleaning Machines	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1.40	2.9%	0	0.0%	0.013	0.1%	0	0.0%
Stationary Combustion Equipment	3.91	5.3%	3.79	5.6%	66.04	19.4%	6.27	3.7%	14.36	11.2%	4.50	9.4%	0	0.0%	4.60E-02	0.3%	0	0.0%
Sulfuric Acid Batteries Maintenance	0.008	0.0%	0.008	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Surface Coatings	0.0115	0.0%	0.0115	0.0%	0	0.0%	0	0.0%	0	0.0%	3.08	6.4%	0	0.0%	1.20	7.3%	0	0.0%
Vehicle maintenance exhaust	0.62	0.8%	0.62	0.9%	7.65	2.3%	0.61	0.4%	4.24	3.3%	0.76	1.6%	0	0.0%	0.13	0.8%	0	0.0%
Welding	0.12	0.2%	0.12	0.2%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	4.52E-03	0.0%	0	0.0%
Wet Cooling Towers	0.094	0.1%	0.094	0.1%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Wood Chipper and Storage	5.69	7.7%	2.44	3.6%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Woodworking	3.81	5.2%	3.81	5.6%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
X-Ray Processing	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0.23	0.5%	0	0.0%	0	0.0%	0	0.0%
Total	74.0	100.0%	68.2	100.0%	339.7	100.0%	167.6	100.0%	128.1	100.0%	48.1	100.0%	0.29	100.0%	16.3	100.0%	0.40	100.0%

SECTION 1

INTRODUCTION

Background

Malmstrom Air Force Base (MAFB) has completed historical air emissions inventories, with the latest completed by Earth Tech for CY 1996. MAFB received their final Title V permit in July, 2000. EQ was contracted to update past emission inventories and provide a representative emission estimate for CY 1999. EQ reviewed the source identification list from 1996, current operating permits, and the draft Title V permit, and removed sources that have been shut down, added sources which have been installed since the past inventory, and updated source operations based upon current conditions. In addition, EQ re-calculated emission estimates based upon the guidance provided by Det 1, HSC/OEBQ in the document titled "Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations," May 1999. A summary of the emission estimates is provided in this document. A summary of the base history follows.

Malmstrom Air Force Base (MAFB) is located in Cascade County in north-central Montana, on the eastern border of the City of Great Falls, consisting of approximately 3,159 acres with a population estimated to be 55,100. MAFB was established in 1942 as the Great Falls Army Base. The name was changed to Malmstrom AFB in 1956. The facility is under authority of the United States Air Force's (USAF) Space Command (AFSPC) and houses the 341st Missile Wing. The 341st Missile Wing operates 200 Minuteman missile launch facilities and 20 Minuteman missile alert facilities. Approximately 4,350 military and 450 civilians, work at MAFB. The socioeconomic impact on Great Falls results in over 10,000 people added to the city's population and $276 million added to the area economy.

Discussion

Air emissions at MAFB occur as the results of the training exercises and other activities associated with servicing the missile launch and missile alert facilities. However, the missile facilities are located at 220 remote locations; therefore, emissions at these locations were not included within the calculations for the MAFB AEI. The MAFB AEI encompasses potential stationary sources at the base including base maintenance. Mobile sources, including aircraft, on-road and off-road vehicles, and aerospace ground support equipment (AGSE) were not included in this AEI. Stationary sources include operations such as fuel storage and distribution, degreasing, surface coating, abrasive blasting, maintenance activities and ancillary mission activities. Sources related to ancillary mission activities include boilers, generators, storage tanks, and fueling stations. Please note that the following activities which are not part of the MAFB base operations (per EPA's August 1996 EPA memorandum entitled "Major Source Determination for Military Installations under the Air Toxics, New Source Review, and Title V Operating Permit Programs of the Clean Air Act" were not necessarily included in the emission inventory:

1) Burger King
2) Remote operations at the missile facilities
3) Residental Housing Heating Equipment
4) Other Personnel Support Activities (church, rec. parks, grocery store, schools, etc.).

The CY1999 inventory included actual and potential to emit emission estimates for regulated pollutants. The regulated pollutant target list (provided in Appendix A), for the purpose of this inventory, included pollutants defined under 40 CFR 70.2, particulate matter (PM) with an aerodynamic diameter ≤10 Microns (PM10) , sulfur dioxide (SO_2), oxides of nitrogen (NO_x) , carbon monoxide (CO), volatile organic compounds (VOC), pollutants for which Title 1 NAAQS has been promulgated, pollutants subject to a standard under the NSPS program, ozone depleting substances regulated under Title VI, hazardous air pollutants (HAPs) subject to standards under CAA Section 112, and substances regulated under the accidental release prevention program under Section 112 (r).[Note: Where PM10 data was not available total PM was used as a worst case substitute.]

Emission estimates for each source were determined using the guidance document provided by Det 1, HSC/OEBQ entitled "Air emissions Inventory Guidance Document for Stationary Sources at Air Force Installations." Potential to emit (PTE) estimates were determined for each stationary source category so that the source designation could be determined within the requirements of Title V. The Title V source designation is not discussed for each individual emission source in this report. The goal of the program was to provide a representative emission estimate, not determine the applicability of Title V regulations to each individual source.

The inventory was conducted by reviewing the Earth Tech CY 1996 emissions inventory for MAFB and comments regarding the inventory provided by Mr. David Heckler of MAFB 341st Civil Engineering Squadron (CES), Environmental Engineering Flight, CEVC. EQ conducted an initial conference call with Mr. Heckler to discuss sources, key base contacts, and emission calculation methodology. After completion of the conference call, EQ prepared an initial data request list and submitted this document to Mr. Heckler for distribution so that many of the data items necessary to complete the inventory could be collected prior to the initiation of the physical inventory.

The physical inventory was conducted by 3 persons for 5 days. The physical inventory allowed EQ to note changes in source operations, update the source data base and gather pertinent information to estimate emissions. Emission estimates were made based upon the guidance document provided by Det 1, HSC/OEBQ, "Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations." EQ developed a calculation algorithm in an excel spreadsheet for each source category. The guidance document was used as the primary reference for this inventory. The spreadsheets developed for each source note the calculation methodology, variables, source of data (base personnel or reference document), basis for PTE, example calculation and emission summary.

The report is organized in the following manner. Each source category is presented in an independent section. Within each section, the standard industrial classification (SIC) code,

source classification (SCC) code, actual emissions, potential emissions, and references are provided along with a discussion of the source.

Summary Of Results

Tables 1-1 and 1-2 summarize the actual and potential emissions for CY1999 at MAFB, including total actual and potential emissions of HAPs and ODS. Tables 1-3 and 1-4 summarize individual actual and potential emissions of HAPs.

Based on the emission inventory, Malmstrom AFB has potential emissions from stationary sources that exceed the major threshold of 100 tpy for NOx, SO_2, and CO. The potential emissions of total HAPs at MAFB are less than 25 tpy, and no single HAP exceeds 10 tpy.

Table 1-1.
1999 Air Emission Inventory Pollutant Summary (Actual)
MALMSTROM AFB, MT

Source	PM		PM-10		NOx		SO2		CO		VOC		Lead		Total HAPs		ODS	
Category	tons/yr	% of total	tons/yr	% of total	tons/yr	% of total	tons/yr	% of total	tons/yr	% of total	tons/yr	% of total	tons/yr	% of total	tons/yr	% of total	tons/yr	% of total
Abrasive Blasting	0.47	5.7%	0.40	7.5%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Asphalt Paving	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Classified Document Incinerator	0.0010588	0.0%	0.0007109	0.0%	0.0004538	0.0%	0.0003781	0.0%	0.0015	0.0%	0.0004538	0.0%	0	0.0%	0.0015	0.0%	0	0.0%
Coal Storage/Handling	0.01	0.1%	0.01	0.2%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Equipment Leaks	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0.18	0.8%	0	0.0%	0.022	0.5%	0	0.0%
External Combustion Sources	1.25	15.1%	1.25	23.5%	38.67	87.9%	95.6	99.4%	31.7	94.4%	1.22	5.2%	0.03	79.7%	0.99	24.7%	0	0.0%
Fire Fighter Training	0.02	0.3%	0.02	0.4%	0.13	0.3%	0	0.0%	0.04	0.1%	0.06	0.2%	0	0.0%	0.001645	0.0%	0	0.0%
Fuel Spills	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0.091	0.4%	0	0.0%	0.001	0.0%	0	0.0%
Fuel Storage (Tanks)	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1.34	5.7%	0	0.0%	0.10	2.4%	0	0.0%
Fuel Transfer	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	5.3E-03	0.0%	0	0.0%	5.4E-04	0.0%	0	0.0%
Gasoline Service Stations	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0.74	3.1%	0	0.0%	0.05	1.4%	0	0.0%
Heavy Construction Operations	3.8	46.1%	1.7	32.3%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Landfarm	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	3.51	14.9%	0	0.0%	0.345	8.6%	0	0.0%
Miscellaneous Chemical Use	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	2.41	10.2%	0	0.0%	0.87	21.6%	0	0.0%
Open Detonation of Energetic Materials	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0.003	0.0%	0	0.0%	0.0002	0.5%	0.0002	0.0%	0	0.0%
Ozone Depleting Substances	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0.40	100.0%
Pesticide Application	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0.67	2.8%	0	0.0%	0	0.0%	0	0.0%
Photographic Equipment	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0.03	0.1%	0	0.0%	0	0.0%	0	0.0%
Sanitary Landfill	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	12	50.3%	0	0.0%	1.30	32.4%	0	0.0%
Sheet Metal Shop	0.0042	0.1%	0.0042	0.1%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0.0001664	0.0%	0	0.0%
Site Restoration	0	0.0%	0	0.0%	0	0.0%		0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Small Arms Firing	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0.06	0.2%	0	0.0%	0.0083	19.8%	0.0083	0.2%	0	0.0%
Solvent Cleaning Machines	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0.33	1.4%	0	0.0%	0.003	0.1%	0	0.0%
Stationary Combustion Equipment	0.16	2.0%	0.15	2.8%	3.39	7.7%	0.42	0.4%	0.76	2.3%	0.19	0.8%	0	0.0%	1.84E-03	0.0%	0	0.0%
Sulfuric Acid Batteries Maintenance	0.001	0.0%	0.001	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Surface Coatings	0.0027	0.0%	0.0027	0.1%	0	0.0%	0	0.0%	0	0.0%	0.73	3.1%	0	0.0%	0.29	7.1%	0	0.0%
Vehicle maintenance exhaust	0.15	1.8%	0.15	2.8%	1.82	4.1%	0.15	0.2%	1.01	3.0%	0.18	0.8%	0	0.0%	0.031	0.8%	0	0.0%
Welding	0.03	0.4%	0.03	0.5%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1.08E-03	0.0%	0	0.0%
Wet Cooling Towers	0.094	1.1%	0.094	1.8%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Wood Chipper and Storage	1.35	16.4%	0.58	10.9%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Woodworking	0.91	11.0%	0.91	17.1%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
X-Ray Processing	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0.06	0.2%	0	0.0%	0	0.0%	0	0.0%
Total	8.3	100.0%	5.3	100.0%	44.0	100.0%	96.1	100.0%	33.5	100.0%	23.6	100.0%	0.04	100.0%	4.0	100.0%	0.40	100.0%

Table 1-2.
1999 Air Emission Inventory Pollutant Summary (Potential)
MALMSTROM AFB, MT

Source	PM		PM-10		NOx		SO2		CO		VOC		Lead		Total HAPs		ODS	
Category	tons/yr	% of total	tons/yr	% of total	tons/yr	% of total	tons/yr	% of total	tons/yr	% of total	tons/yr	% of total	tons/yr	% of total	tons/yr	% of total	tons/yr	% of total
Abrasive Blasting	2.0	2.7%	1.7	2.5%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Asphalt Paving	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Classified Document Incinerator	0.0044	0.0%	0.0030	0.0%	0.0019	0.0%	0.0015881	0.0%	0.0064	0.0%	0.0019	0.0%	0	0.0%	0.0064	0.0%	0	0.0%
Coal Storage/Handling	0.04	0.1%	0.04	0.1%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Equipment Leaks	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0.18	0.4%	0	0.0%	0.022	0.1%	0	0.0%
External Combustion Sources	53.8	72.7%	53.8	78.8%	265.4	78.1%	160.7	95.9%	109.1	85.2%	2.24	4.7%	0.25	87.7%	8.82	54.1%	0	0.0%
Fire Fighter Training	0.09	0.1%	0.09	0.1%	0.55	0.2%	0	0.0%	0.15	0.1%	0.24	0.5%	0	0.0%	0.0069	0.0%	0	0.0%
Fuel Spills	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0.383	0.8%	0	0.0%	0.006	0.0%	0	0.0%
Fuel Storage (Tanks)	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	5.61	11.7%	0	0.0%	0.41	2.5%	0	0.0%
Fuel Transfer	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	7.0E-03	0.0%	0	0.0%	8.9E-04	0.0%	0	0.0%
Gasoline Service Stations	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	3.11	6.5%	0	0.0%	0.23	1.4%	0	0.0%
Heavy Construction Operations	3.8	5.2%	1.7	2.5%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Landfarm	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	3.51	7.3%	0	0.0%	0.35	2.1%	0	0.0%
Miscellaneous Chemical Use	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	10.14	21.1%	0	0.0%	3.71	22.8%	0	0.0%
Open Detonation of Energetic Materials	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0.012	0.0%	0	0.0%	0.0009	0.3%	0.0009	0.0%	0	0.0%
Ozone Depleting Substances	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0.40	100.0%
Pesticide Application	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0.67	1.4%	0	0.0%	0	0.0%	0	0.0%
Photographic Equipment	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0.12	0.2%	0	0.0%	0	0.0%	0	0.0%
Sanitary Landfill	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	11.9	24.7%	0	0.0%	1.30	8.0%	0	0.0%
Sheet Metal Shop	0.0175	0.0%	0.0175	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0.0006989	0.0%	0	0.0%
Site Restoration	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Small Arms Firing	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0.24	0.2%	0	0.0%	0.0347	12.0%	0.0347	0.2%	0	0.0%
Solvent Cleaning Machines	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1.40	2.9%	0	0.0%	0.013	0.1%	0	0.0%
Stationary Combustion Equipment	3.91	5.3%	3.79	5.6%	66.04	19.4%	6.27	3.7%	14.36	11.2%	4.50	9.4%	0	0.0%	4.60E-02	0.3%	0	0.0%
Sulfuric Acid Batteries Maintenance	0.008	0.0%	0.008	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Surface Coatings	0.0115	0.0%	0.0115	0.0%	0	0.0%	0	0.0%	0	0.0%	3.08	6.4%	0	0.0%	1.20	7.3%	0	0.0%
Vehicle maintenance exhaust	0.62	0.8%	0.62	0.9%	7.65	2.3%	0.61	0.4%	4.24	3.3%	0.76	1.6%	0	0.0%	0.13	0.8%	0	0.0%
Welding	0.12	0.2%	0.12	0.2%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	4.52E-03	0.0%	0	0.0%
Wet Cooling Towers	0.094	0.1%	0.094	0.1%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Wood Chipper and Storage	5.69	7.7%	2.44	3.6%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Woodworking	3.81	5.2%	3.81	5.6%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
X-Ray Processing	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0.23	0.5%	0	0.0%	0	0.0%	0	0.0%
Total	74.0	100.0%	68.2	100.0%	339.7	100.0%	167.6	100.0%	128.1	100.0%	48.1	100.0%	0.29	100.0%	16.3	100.0%	0.40	100.0%

Table 1-3.
Air Emission Inventory Hazardous Air Pollutant Summary (Actual)
MALMSTROM AFB, MT

	Source Type																																
HAP	Abrasive Blasting	Asphalt Paving	Classified Document Incinerator	Coal Storage/ Handling	Equipment Leaks	External Combustion Sources	Fire Fighter Training	Fuel Transfer Operations	Fuel spills	Fuel Storage (Tanks)	Gasoline Service Stations	Heavy Construction Operations	Landfarm	Miscellaneous Chemical Use	Open Detonation of Energetic Materials	Ozone Depleting Substances	Pesticide Application	Photo-graphic Equipment	Sanitary Landfill	Sheet Metal Shop	Site Restoration	Small Arms Firing	Solvent Cleaning Machines	Stationary Combustion Equipment	Sulfuric Acid Batteries Maintenance	Surface Coatings	Vehicle maintenance exhaust	Welding	Wet Cooling Towers	Wood Chipper and Storage	Wood-working	X-Ray Processing	Total
Acetaldehyde	0	0	0	0	0	1.43E-03	0	0	0	0	0	0	0	3.50E-07	0	0	0	0	0	0	0	0	0	3.00E-04	0	0	3.08E-02	0	0	0	0	0	3.25E-02
Acetamide	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acetonitrile	0	0	0	0	0	0	0	0	0	0	0	0	0	4.83E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.83E-05
Acetophenone	0	0	0	0	0	3.761E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.76E-05
2-Acetylaminofluorene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acrolein	0	0	0	0	0	7.27E-04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.58E-05	0	0	2.59E-06	0	0	0	0	0	0.000765
Acrylamide	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acrylic acid	0	0	0	0	0	0	0	0	0	0	0	0	0	9.51E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.51E-05
Acrylonitrile	0	0	0	0	0	0	0	0	0	0	0	0	0	1.41E-03	0	0	0	0	1.91E-02	0	0	0	0	0	0	0	0	0	0	0	0	0	2.06E-02
Allyl chloride	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4-Aminobiphenyl	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aniline	0	0	0	0	0	0	0	0	0	0	0	0	0	1.55E-06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.55E-06
o-Anisidine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Antimony Compounds	0	0	0	0	0	0	0	0	0	0	0	0	0	8.30E-04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.30E-04
Arsenic Compounds (inorganic including arsine)	0	0	0	0	0	5.12E-02	0	0	0	0	0	0	0	5.00E-07	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.12E-02
Asbestos	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzene (including benzene from gasoline)	0	0	0	0	5.71E-03	3.68E-03	0	1.95E-04	1.47E-04	8.26E-03	4.44E-03	0	7.93E-02	0	0	0	0	0	4.94E-02	0	0	0	0	3.60E-04	0	0	2.57E-05	0	0	0	0	0	1.52E-01
Benzidine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzotrichloride	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzyl chloride	0	0	0	0	0	1.75E-03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.001755
Beryllium Compounds	0	0	0	0	0	2.384E-06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.38E-06
Biphenyl	0	0	0	0	0	4.262E-06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.26E-06
Bis(2-ethylhexyl)phthalate (DEHP)	0	0	0	0	0	1.83E-04	0	0	0	0	0	0	0	2.85E-04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.68E-04
Bis(chloromethyl)ether	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bromoform	0	0	0	0	0	9.778E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.78E-05
1,3-Butadiene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.51E-05	0	0	1.03E-06	0	0	0	0	0	1.62E-05
Cadmium Compounds	0	0	0	0	0	4.31E-03	0	0	0	0	0	0	0	8.84E-02	0	0	0	0	0	0	0	0	0	9.695E-07	0	0	0	0	0	0	0	0	9.27E-02
Calcium cyanamide	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Captan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carbaryl	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carbon disulfide	0	0	0	0	0	3.26E-04	0	0	0	0	0	0	0	0	0	0	0	0	2.52E-03	0	0	0	0	0	0	0	0	0	0	0	0	0	2.84E-03
Carbon tetrachloride	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.51E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	3.51E-05
Carbonyl sulfide	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.68E-03	0	0	0	0	0	0	0	0	0	0	0	0	0	1.68E-03
Catechol	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloramben	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chlordane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chlorine	0	0	0	0	0	0	0	0	0	0	0	0	0	1.65E-02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.65E-02
Chloroacetic acid	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2-Chloroacetophenone	0	0	0	0	0	1.755E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.75E-05
Chlorobenzene	0	0	0	0	0	5.516E-05	0	0	0	0	0	0	0	0	0	0	0	0	1.60E-03	0	0	0	0	0	0	0	0	0	0	0	0	0	1.66E-03
Chlorobenzilate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloroform	0	0	0	0	0	1.48E-04	0	0	0	0	0	0	0	0	0	0	0	0	2.04E-04	0	0	0	0	0	0	0	0	0	0	0	0	0	3.52E-04
Chloromethyl methyl ether	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloroprene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chromium Compounds	0	0	0	0	0	2.87E-04	0	0	0	0	0	0	0	4.83E-03	0	0	0	0	0	4.16E-05	0	0	0	1.86E-06	0	0	0	4.86E-06	0	0	0	0	5.16E-03
Cobalt Compounds	0	0	0	0	0	1.678E-05	0	0	0	0	0	0	0	1.68E-05	0	0	0	0	0	0	0	0	0	0	0	5.51E-05	0	7.69E-07	0	0	0	0	8.94E-05
Coke Oven Emissions	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cresols/Cresylic acid (isomers and mixture)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
o-Cresol	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
m-Cresol	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
p-Cresol	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cumene	0	0	0	0	6.87E-04	1.329E-05	0	1.91E-05	7.32E-05	2.97E-04	1.48E-04	0	4.05E-03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.29E-03
Cyanide Compounds	0	0	0	0	0	6.27E-03	0	0	0	0	0	0	0	3.13E-04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.58E-03
2,4-D, salts and esters	0	0	0	0	0	7.02E-07	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.02E-07
DDE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diazomethane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dibenzofurans	0	0	1.95E-10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.95E-10
1,2-Dibromo-3-chloropropane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dibutylphthalate	0	0	0	0	0	0	0	0	0	0	0	0	0	1.95E-04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.95E-04
1,4-Dichlorobenzene(p)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.76E-03	0	0	0	0	0	0	0	0	0	0	0	0	0	1.76E-03
3,3-Dichlorobenzidene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dichloroethyl ether (Bis(2-chloroethyl)ether)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1,3-Dichloropropene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dichlorvos	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diethanolamine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N,N-Diethyl aniline (N,N-Dimethylaniline)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diethyl sulfate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3,3-Dimethoxybenzidine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 1-3.
Air Emission Inventory Hazardous Air Pollutant Summary (Actual)
MALMSTROM AFB, MT

	Source Type																																
HAP	Abrasive Blasting	Asphalt Paving	Classified Document Incinerator	Coal Storage/ Handling	Equipment Leaks	External Combustion Sources	Fire Fighter Training	Fuel Transfer Operations	Fuel spills	Fuel Storage (Tanks)	Gasoline Service Stations	Heavy Construction Operations	Landfarm	Miscellaneous Chemical Use	Open Detonation of Energetic Materials	Ozone Depleting Substances	Pesticide Application	Photo-graphic Equipment	Sanitary Landfill	Sheet Metal Shop	Site Restoration	Small Arms Firing	Solvent Cleaning Machines	Stationary Combustion Equipment	Sulfuric Acid Batteries Maintenance	Surface Coatings	Vehicle maintenance exhaust	Welding	Wet Cooling Towers	Wood Chipper and Storage	Wood-working	X-Ray Processing	Total
Dimethyl aminoazobenzene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3,3'-Dimethyl benzidine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dimethyl carbamoyl chloride	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dimethyl formamide	0	0	0	0	0	0	0	0	0	0	0	0	0	1.24E-04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.24E-04
1,1-Dimethyl hydrazine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dimethyl phthalate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dimethyl sulfate	0	0	0	0	0	1.20E-04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00012
4,6-Dinitro-o-cresol, and salts	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2,4-Dinitrophenol	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2,4-Dinitrotoluene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1,4-Dioxane (1,4-Diethyleneoxide)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1,2-Diphenylhydrazine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Epichlorohydrin (l-Chloro-2,3-epoxypropane)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1,2-Epoxybutane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethyl acrylate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethyl benzene	0	0	0	0	1.03E-03	2.36E-04	0	2.49E-05	1.47E-04	5.71E-04	2.96E-04	0	7.23E-03	1.58E-02	0	0	0	0	2.79E-02	0	0	0	0	0	0	6.56E-03	0	0	0	0	0	0	5.98E-02
Ethyl carbamate (Urethane)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethyl chloride (Chloroethane)	0	0	0	0	0	1.05E-04	0	0	0	0	0	0	0	0	0	0	0	0	4.60E-03	0	0	0	0	0	0	0	0	0	0	0	0	0	4.70E-03
Ethylene dibromide (Dibromoethane)	0	0	0	0	0	3.009E-06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.01E-06
Ethylene dichloride (1,2-Dichloroethane)	0	0	0	0	0	1.00E-04	0	0	0	0	0	0	0	0	0	0	0	0	2.31E-03	0	0	0	0	0	0	0	0	0	0	0	0	0	2.41E-03
Ethylene glycol	0	0	0	0	0	0	0	0	0	0	0	0	0	8.44E-02	0	0	0	0	0	0	0	0	0	0	0	0.0039	0	0	0	0	0	0	8.83E-02
Ethylene imine (Aziridine)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethylene oxide	0	0	0	0	0	0	0	0	0	0	0	0	0	5.00E-08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5E-08
Ethylene thiourea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethylidene dichloride (1,1-Dichloroethane)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.11E-03	0	0	0	0	0	0	0	0	0	0	0	0	0	1.11E-03
Formaldehyde	0	0	0	0	0	1.55E-02	1.65E-03	0	0	0	0	0	0	5.50E-07	0	0	0	0	0	0	0	0	0	0.0005	0	0	3.26E-05	0	0	0	0	0	1.77E-02
Glycol ethers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.05E-03	0	0	0	0	0	0	0	0	0	2.05E-03
Heptachlor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hexachlorobenzene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hexachlorobutadiene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hexachlorocyclopentadiene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hexachloroethane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hexamethylene-1,6-diisocyanate	0	0	0	0	0	0	0	0	0	0	0	0	0	1.02E-03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.02E-03
Hexamethylphosphoramide	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hexane	0	0	0	0	1.74E-03	3.58E-01	0	5.69E-05	3.00E-05	6.72E-03	3.70E-03	0	3.34E-02	2.93E-02	0	0	0	0	3.23E-02	0	0	0	0	0	0	0	0	0	0	0	0	0	4.65E-01
Hydrazine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrochloric acid	0	0	1.51E-03	0	0	4.51E-01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.53E-01
Hydrogen fluoride (Hydrofluoric acid)	0	0	0	0	0	5.64E-02	0	0	0	0	0	0	0	5.50E-06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.64E-02
Hydroquinone	0	0	0	0	0	0	0	0	0	0	0	0	0	1.25E-04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.25E-04
Isophorone	0	0	0	0	0	1.45E-03	0	0	0	0	0	0	0	9.38E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.001548
Lead Compounds	0	0	0	0	0	3.32E-02	0	0	0	0	0	0	0	1.49E-03	2.10E-04	0	0	0	0	0	0	8.27E-03	0	0	0	0	0	0	0	0	0	0	4.32E-02
Lindane (all isomers)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Maleic anhydride	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Manganese Compounds	0	0	0	0	0	1.06E-04	0	0	0	0	0	0	0	0	0	0	0	0	0	8.32E-05	0	0	0	1.124E-05	0	0	0	1.07E-03	0	0	0	0	1.27E-03
Mercury Compounds	0	0	0	0	0	5.166E-05	0	0	0	0	0	0	0	0	0	0	0	0	3.34E-06	0	0	0	0	9.275E-07	0	0	0	0	0	0	0	0	5.59E-05
Methanol	0	0	0	0	0	0	0	0	0	0	0	0	0	1.33E-01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.33E-01
Methoxychlor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Methyl bromide (Bromomethane)	0	0	0	0	0	4.01E-04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000401
Methyl chloride (Chloromethane)	0	0	0	0	0	1.33E-03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.001329
Methyl chloroform (1,1,1-Trichloroethane)	0	0	0	0	0	0	0	0	0	0	0	0	0	1.15E-02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.15E-02
Methyl ethyl ketone (2-Butanone)	0	0	0	0	0	9.78E-04	0	0	0	0	0	0	0	1.86E-01	0	0	0	0	2.91E-02	0	0	0	0	0	0	1.30E-02	0	0	0	0	0	0	2.29E-01
Methyl hydrazine	0	0	0	0	0	4.26E-04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000426
Methyl iodide (Iodomethane)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Methyl isobutyl ketone (Hexone)	0	0	0	0	0	0	0	0	0	0	0	0	0	1.31E-02	0	0	0	0	1.07E-02	0	0	0	0	0	0	7.22E-04	0	0	0	0	0	0	2.45E-02
Methyl isocyanate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Methyl methacrylate	0	0	0	0	0	5.01E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.01E-05
Methyl tert butyl ether	0	0	0	0	1.03E-03	8.77E-05	0	0	4.22E-06	6.11E-02	3.41E-02	0	1.21E-01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.17E-01
4,4-Methylene bis(2-chloroaniline)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Methylene chloride (Dichloromethane)	0	0	0	0	0	7.27E-04	0	0	0	0	0	0	0	9.88E-03	0	0	0	0	6.92E-02	0	0	0	0	0	0	0	0	0	0	0	0	0	7.98E-02

Table 1-3.
Air Emission Inventory Hazardous Air Pollutant Summary (Actual)
MALMSTROM AFB, MT

HAP	Source Type																																
	Abrasive Blasting	Asphalt Paving	Classified Document Incinerator	Coal Storage/ Handling	Equipment Leaks	External Combustion Sources	Fire Fighter Training	Fuel Transfer Operations	Fuel spills	Fuel Storage (Tanks)	Gasoline Service Stations	Heavy Construction Operations	Landfarm	Miscellaneous Chemical Use	Open Detonation of Energetic Materials	Ozone Depleting Substances	Pesticide Application	Photo-graphic Equipment	Sanitary Landfill	Sheet Metal Shop	Site Restoration	Small Arms Firing	Solvent Cleaning Machines	Stationary Combustion Equipment	Sulfuric Acid Batteries Maintenance	Surface Coatings	Vehicle maintenance exhaust	Welding	Wet Cooling Towers	Wood Chipper and Storage	Wood-working	X-Ray Processing	Total
Methylene diphenyl diisocyanate (MDI)	0	0	0	0	0	0	0	0	0	0	0	0	0	1.05E-03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.05E-03
4,4'-Methylenedianiline	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mineral fibers (fine)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Naphthalene	0	0	0	0	7.13E-05	1.54E-04	0	8.41E-08	1.46E-04	1.54E-07	0	0	0	0	0	0	0	0	0	0	0	0	9.48E-04	3.38E-05	0	0	2.38E-06	0	0	0	0	0	1.36E-03
Nickel Compounds	0	0	0	0	0	4.22E-04	0	0	0	0	0	0	0	2.59E-05	0	0	0	0	0	4.16E-05	0	0	0	1.607E-05	0	0	0	3.91E-06	0	0	0	0	5.10E-04
Nitrobenzene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4-Nitrobiphenyl	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4-Nitrophenol	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2-Nitropropane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N-Nitroso-N-methylurea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N-Nitrosodimethylamine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N-Nitrosomorpholine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Parathion	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pentachloronitrobenzene (Quintobenzene)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pentachlorophenol	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phenol	0	0	0	0	0	4.011E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.785E-06	0	0	0	0	0	0	0	0	4.19E-05
p-Phenylenediamine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phosgene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phosphine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phosphorus	0	0	0	0	0	0	0	0	0	0	0	0	0	1.25E-04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.25E-04
Phthalic anhydride	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychlorinated biphenyls (Aroclors)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polycyclic Organic Matter	0	0	0	0	0	1.748E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.65E-05	0	0	4.66E-06	0	0	0	0	0	8.86E-05
1,3-Propane sultone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
beta-Propiolactone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Propionaldehyde	0	0	0	0	0	9.53E-04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000953
Propoxur (Baygon)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Propylene dichloride (1,2-Dichloropropane)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.16E-03	0	0	0	0	0	0	0	0	0	0	0	0	0	1.16E-03
Propylene oxide	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1,2-Propylenimine (2-Methyl aziridine)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Quinoline	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Quinone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Radionuclides (including radon)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Selenium Compounds	0	0	0	0	0	4.769E-06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.77E-06
Styrene	0	0	0	0	0	6.268E-05	0	0	0	0	0	0	0	6.91E-03	0	0	0	0	0	0	0	0	0	0	0	5.76E-04	0	0	0	0	0	0	7.55E-03
Styrene oxide	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2,3,7,8-Tetrachlorodibenzo-p-dioxin	0	0	8.56E-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.56E-14
1,1,2,2-Tetrachloroethane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.06E-02	0	0	0	0	0	0	0	0	0	0	0	0	0	1.06E-02
Tetrachloroethylene (Perchloroethylene)	0	0	0	0	0	1.08E-04	0	0	0	0	0	0	0	1.09E-02	0	0	0	0	3.53E-02	0	0	0	0	0	0	0	0	0	0	0	0	0	4.63E-02
Titanium tetrachloride	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Toluene	0	0	0	0	5.36E-03	1.28E-03	0	1.33E-04	2.98E-04	9.50E-03	5.18E-03	0	5.46E-02	1.29E-01	0	0	0	0	8.66E-01	0	0	0	0	2.30E-04	0	1.73E-02	1.13E-05	0	0	0	0	0	1.09E+00
2,4-Toluene diamine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2,4-Toluene diisocyanate	0	0	0	0	0	0	0	0	0	0	0	0	0	6.02E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.02E-05
o-Toluidine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Toxaphene (chlorinated camphene)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1,2,4-Trichlorobenzene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1,1,1-Trichloroethane	0	0	0	0	0	5.014E-05	0	0	0	0	0	0	0	0	0	0	0	0	3.65E-03	0	0	0	0	0	0	0	0	0	0	0	0	0	3.70E-03
Trichloroethylene	0	0	0	0	0	0	0	0	0	0	0	0	0	2.22E-03	0	0	0	0	2.11E-02	0	0	0	0	0	0	0	0	0	0	0	0	0	2.33E-02
2,4,5-Trichlorophenol	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2,4,6-Trichlorophenol	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Triethylamine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trifluralin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2,2,4-Trimethylpentane	0	0	0	0	9.23E-04	0	0	2.80E-07	3.75E-06	9.29E-03	5.18E-03	0	1.84E-02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.38E-02
Vinyl acetate	0	0	0	0	0	1.905E-05	0	0	0	0	0	0	0	5.18E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.08E-05
Vinyl bromide	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vinyl chloride	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.61E-02	0	0	0	0	0	0	0	0	0	0	0	0	0	2.61E-02
Vinylidene chloride (1,1-Dichloroethylene)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Xylenes (isomers and mixture)	0	0	0	0	5.00E-03	9.276E-05	0	1.14E-04	5.89E-04	2.84E-03	1.48E-03	0	2.73E-02	1.22E-01	0	0	0	0	7.32E-02	0	0	0	0	2.64E-04	0	2.43E-01	7.85E-06	0	0	0	0	0	4.76E-01
o-Xylenes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
m-Xylenes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
p-Xylenes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total HAPs	0	0	1.51E-03	0	2.16E-02	9.94E-01	0	5.45E-04	1.44E-03	9.86E-02	5.45E-02	0	3.45E-01	8.70E-01	2.10E-04	0	0	0	1.29E+00	1.66E-04	0	8.27E-03	3.00E-03	1.84E-03	0	2.85E-01	3.09E-02	1.08E-03	0	0	0	0	4.01

TABLE 1-4.
1999 Air Emission Inventory Hazardous Air Pollutant Summary (Potential)
MALMSTROM AFB, MT

	Source Type																																
HAP	Abrasive Blasting	Asphalt Paving	Classified Document Incinerator	Coal Storage/ Handling	Equipment Leaks	External Combustion Sources	Fire Fighter Training	Fuel Transfer Operations	Fuel spills	Fuel Storage (Tanks)	Gasoline Service Stations	Heavy Construction Operations	Landfarm	Miscellaneous Chemical Use	Open Detonation of Energetic Materials	Ozone Depleting Substances	Pesticide Application	Photo-graphic Equipment	Sanitary Landfill	Sheet Metal Shop	Site Restoration	Small Arms Firing	Solvent Cleaning Machines	Stationary Combustion Equipment	Sulfuric Acid Batteries Maintenance	Surface Coatings	Vehicle maintenance exhaust	Welding	Wet Cooling Towers	Wood Chipper and Storage	Wood-working	X-Ray Processing	Total
Acetaldehyde	0	0	0	0	0	1.10E-02	0	0	0	0	0	0	0	1.47E-06	0	0	0	0	0	0	0	0	0	8.69E-03	0	0	1.30E-01	0	0	0	0	0	1.49E-01
Acetamide	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acetonitrile	0	0	0	0	0	0	0	0	0	0	0	0	0	2.03E-04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.03E-04
Acetophenone	0	0	0	0	0	2.88E-04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000288
2-Acetylaminofluorene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acrolein	0	0	0	0	0	5.57E-03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.04E-03	0	0	1.09E-05	0	0	0	0	0	6.62E-03
Acrylamide	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acrylic acid	0	0	0	0	0	0	0	0	0	0	0	0	0	3.99E-04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.99E-04
Acrylonitrile	0	0	0	0	0	0	0	0	0	0	0	0	0	5.94E-03	0	0	0	0	1.91E-02	0	0	0	0	0	0	0	0	0	0	0	0	0	2.51E-02
Allyl chloride	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4-Aminobiphenyl	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aniline	0	0	0	0	0	0	0	0	0	0	0	0	0	6.51E-06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.51E-06
o-Anisidine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Antimony Compounds	0	0	0	0	0	0	0	0	0	0	0	0	0	3.49E-03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.49E-03
Arsenic Compounds (inorganic including arsine)	0	0	0	0	0	3.92E-01	0	0	0	0	0	0	0	2.10E-06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.92E-01
Asbestos	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzene (including benzene from gasoline)	0	0	0	0	5.71E-03	2.53E-02	0	2.60E-04	6.18E-04	3.47E-02	1.87E-02	0	7.93E-02	0	0	0	0	0	4.94E-02	0	0	0	0	1.05E-02	0	0	1.08E-04	0	0	0	0	0	2.25E-01
Benzidine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzotrichloride	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzyl chloride	0	0	0	0	0	2.63E-02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.02628
Beryllium Compounds	0	0	0	0	0	7.76E-06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.76E-06
Biphenyl	0	0	0	0	0	3.27E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.27E-05
Bis(2-ethylhexyl)phthalate (DEHP)	0	0	0	0	0	1.40E-03	0	0	0	0	0	0	0	1.19E-03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.60E-03
Bis(chloromethyl)ether	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bromoform	0	0	0	0	0	7.49E-04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000749
1,3-Butadiene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.41E-04	0	0	4.35E-06	0	0	0	0	0	4.45E-04
Cadmium Compounds	0	0	0	0	0	3.15E-02	0	0	0	0	0	0	0	3.71E-01	0	0	0	0	0	0	0	0	0	4.083E-06	0	0	0	0	0	0	0	0	4.03E-01
Calcium cyanamide	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Captan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carbaryl	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carbon disulfide	0	0	0	0	0	2.50E-03	0	0	0	0	0	0	0	0	0	0	0	0	2.52E-03	0	0	0	0	0	0	0	0	0	0	0	0	0	5.01E-03
Carbon tetrachloride	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.51E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	3.51E-05
Carbonyl sulfide	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.68E-03	0	0	0	0	0	0	0	0	0	0	0	0	0	1.68E-03
Catechol	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloramben	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chlordane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chlorine	0	0	0	0	0	0	0	0	0	0	0	0	0	6.93E-02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.93E-02
Chloroacetic acid	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2-Chloroacetophenone	0	0	0	0	0	1.34E-04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000134
Chlorobenzene	0	0	0	0	0	4.23E-04	0	0	0	0	0	0	0	0	0	0	0	0	1.60E-03	0	0	0	0	0	0	0	0	0	0	0	0	0	2.03E-03
Chlorobenzilate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloroform	0	0	0	0	0	1.13E-03	0	0	0	0	0	0	0	0	0	0	0	0	2.04E-04	0	0	0	0	0	0	0	0	0	0	0	0	0	1.34E-03
Chloromethyl methyl ether	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloroprene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chromium Compounds	0	0	0	0	0	9.43E-04	0	0	0	0	0	0	0	2.03E-02	0	0	0	0	0	1.75E-04	0	0	0	7.81E-06	0	0	0	2.04E-05	0	0	0	0	2.14E-02
Cobalt Compounds	0	0	0	0	0	5.471E-05	0	0	0	0	0	0	0	7.04E-05	0	0	0	0	0	0	0	0	0	0	0	2.31E-04	0	3.23E-06	0	0	0	0	3.60E-04
Coke Oven Emissions	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cresols/Cresylic acid (isomers and mixture)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
o-Cresol	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
m-Cresol	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
p-Cresol	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cumene	0	0	0	0	6.87E-04	1.02E-04	0	2.55E-05	3.08E-04	1.25E-03	6.22E-04	0	4.05E-03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.05E-03
Cyanide Compounds	0	0	0	0	0	4.80E-02	0	0	0	0	0	0	0	1.31E-03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.93E-02
2,4-D, salts and esters	0	0	0	0	0	5.379E-06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.38E-06
DDE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diazomethane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dibenzofurans	0	0	8.19E-10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.19E-10
1,2-Dibromo-3-chloropropane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dibutylphthalate	0	0	0	0	0	0	0	0	0	0	0	0	0	8.19E-04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.19E-04
1,4-Dichlorobenzene(p)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.76E-03	0	0	0	0	0	0	0	0	0	0	0	0	0	1.76E-03
3,3-Dichlorobenzidene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dichloroethyl ether (Bis(2-chloroethyl)ether)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1,3-Dichloropropene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dichlorvos	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diethanolamine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N,N-Diethyl aniline (N,N-Dimethylaniline)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diethyl sulfate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3,3-Dimethoxybenzidine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dimethyl aminoazobenzene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3,3'-Dimethyl benzidine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE 1-4.
1999 Air Emission Inventory Hazardous Air Pollutant Summary (Potential)
MALMSTROM AFB, MT

	Source Type																															
HAP	Abrasive Blasting	Asphalt Paving	Classified Document Incinerator	Coal Storage/ Handling	Equipment Leaks	External Combustion Sources	Fire Fighter Training	Fuel Transfer Operations	Fuel spills	Fuel Storage (Tanks)	Gasoline Service Stations	Heavy Construction Operations	Landfarm	Miscellaneous Chemical Use	Open Detonation of Energetic Materials	Ozone Depleting Substances	Pesticide Application	Photo-graphic Equipment	Sanitary Landfill	Sheet Metal Shop	Site Restoration	Small Arms Firing	Solvent Cleaning Machines	Stationary Combustion Equipment	Sulfuric Acid Batteries Maintenance	Surface Coatings	Vehicle maintenance exhaust	Welding	Wet Cooling Towers	Wood Chipper and Storage	Wood-working	X-Ray Processing	Total
Dimethyl carbamoyl chloride	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dimethyl formamide	0	0	0	0	0	0	0	0	0	0	0	0	0	5.21E-04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.21E-04
1,1-Dimethyl hydrazine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dimethyl phthalate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dimethyl sulfate	0	0	0	0	0	9.22E-04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000922
4,6-Dinitro-o-cresol, and salts	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2,4-Dinitrophenol	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2,4-Dinitrotoluene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1,4-Dioxane (1,4-Diethyleneoxide)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1,2-Diphenylhydrazine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Epichlorohydrin (l-Chloro-2,3-epoxypropane)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1,2-Epoxybutane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethyl acrylate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethyl benzene	0	0	0	0	1.03E-03	8.07E-04	0	3.31E-05	6.17E-04	2.40E-03	1.24E-03	0	7.23E-03	6.64E-02	0	0	0	0	2.79E-02	0	0	0	0	0	0	2.76E-02	0	0	0	0	0	0	1.35E-01
Ethyl carbamate (Urethane)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethyl chloride (Chloroethane)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.60E-03	0	0	0	0	0	0	0	0	0	0	0	0	0	4.60E-03
Ethylene dibromide (Dibromoethane)	0	0	0	0	0	2.305E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.31E-05
Ethylene dichloride (1,2-Dichloroethane)	0	0	0	0	0	7.68E-04	0	0	0	0	0	0	0	0	0	0	0	0	2.31E-03	0	0	0	0	0	0	0	0	0	0	0	0	0	3.08E-03
Ethylene glycol	0	0	0	0	0	0	0	0	0	0	0	0	0	3.55E-01	0	0	0	0	0	0	0	0	0	0	0	1.64E-02	0	0	0	0	0	0	3.71E-01
Ethylene imine (Aziridine)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethylene oxide	0	0	0	0	0	0	0	0	0	0	0	0	0	2.10E-07	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.1E-07
Ethylene thiourea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethylidene dichloride (1,1-Dichloroethane)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.11E-03	0	0	0	0	0	0	0	0	0	0	0	0	0	1.11E-03
Formaldehyde	0	0	0	0	0	4.85E-02	1.65E-03	0	0	0	0	0	0	2.31E-06	0	0	0	0	0	0	0	0	0	1.35E-02	0	0	1.37E-04	0	0	0	0	0	6.38E-02
Glycol ethers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.63E-03	0	0	0	0	0	0	0	0	0	8.63E-03
Heptachlor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hexachlorobenzene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hexachlorobutadiene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hexachlorocyclopentadiene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hexachloroethane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hexamethylene-1,6-diisocyanate	0	0	0	0	0	0	0	0	0	0	0	0	0	4.27E-03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.27E-03
Hexamethylphosphoramide	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hexane	0	0	0	0	1.74E-03	1.16E+00	0	2.39E-04	1.26E-04	2.82E-02	1.55E-02	0	3.34E-02	1.23E-01	0	0	0	0	3.23E-02	0	0	0	0	0	0	0	0	0	0	0	0	0	1.40E+00
Hydrazine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrochloric acid	0	0	6.35E-03	0	0	5.99E+00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.00E+00
Hydrogen fluoride (Hydrofluoric acid)	0	0	0	0	0	7.49E-01	0	0	0	0	0	0	0	2.31E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.49E-01
Hydroquinone	0	0	0	0	0	0	0	0	0	0	0	0	0	5.24E-04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.24E-04
Isophorone	0	0	0	0	0	1.11E-02	0	0	0	0	0	0	0	3.94E-04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.15E-02
Lead Compounds	0	0	0	0	0	2.54E-01	0	0	0	0	0	0	0	6.24E-03	8.82E-04	0	0	0	0	0	0	3.47E-02	0	0	0	0	0	0	0	0	0	0	2.96E-01
Lindane (all isomers)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Maleic anhydride	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Manganese Compounds	0	0	0	0	0	3.73E-04	0	0	0	0	0	0	0	0	0	0	0	0	0	3.49E-04	0	0	0	4.732E-05	0	0	0	4.48E-03	0	0	0	0	5.25E-03
Mercury Compounds	0	0	0	0	0	1.68E-04	0	0	0	0	0	0	0	0	0	0	0	0	3.34E-06	0	0	0	0	3.906E-06	0	0	0	0	0	0	0	0	1.75E-04
Methanol	0	0	0	0	0	0	0	0	0	0	0	0	0	5.57E-01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.57E-01
Methoxychlor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Methyl bromide (Bromomethane)	0	0	0	0	0	3.07E-03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.003074
Methyl chloride (Chloromethane)	0	0	0	0	0	1.02E-02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.010182
Methyl chloroform (1,1,1-Trichloroethane)	0	0	0	0	0	0	0	0	0	0	0	0	0	4.82E-02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.82E-02
Methyl ethyl ketone (2-Butanone)	0	0	0	0	0	7.49E-03	0	0	0	0	0	0	0	7.82E-01	0	0	0	0	2.91E-02	0	0	0	0	0	0	5.47E-02	0	0	0	0	0	0	8.74E-01
Methyl hydrazine	0	0	0	0	0	3.27E-03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.003266
Methyl iodide (Iodomethane)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Methyl isobutyl ketone (Hexone)	0	0	0	0	0	0	0	0	0	0	0	0	0	5.49E-02	0	0	0	0	1.07E-02	0	0	0	0	0	0	3.03E-03	0	0	0	0	0	0	6.86E-02
Methyl isocyanate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Methyl methacrylate	0	0	0	0	0	3.84E-04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000384
Methyl tert butyl ether	0	0	0	0	1.03E-03	6.72E-04	0	0	1.77E-05	2.56E-01	1.43E-01	0	1.21E-01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.22E-01
4,4-Methylene bis(2-chloroaniline)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Methylene chloride (Dichloromethane)	0	0	0	0	0	5.57E-03	0	0	0	0	0	0	0	4.15E-02	0	0	0	0	6.92E-02	0	0	0	0	0	0	0	0	0	0	0	0	0	1.16E-01

TABLE 1-4.
1999 Air Emission Inventory Hazardous Air Pollutant Summary (Potential)
MALMSTROM AFB, MT

	Source Type																																
HAP	Abrasive Blasting	Asphalt Paving	Classified Document Incinerator	Coal Storage/ Handling	Equipment Leaks	External Combustion Sources	Fire Fighter Training	Fuel Transfer Operations	Fuel spills	Fuel Storage (Tanks)	Gasoline Service Stations	Heavy Construction Operations	Landfarm	Miscellaneous Chemical Use	Open Detonation of Energetic Materials	Ozone Depleting Substances	Pesticide Application	Photo-graphic Equipment	Sanitary Landfill	Sheet Metal Shop	Site Restoration	Small Arms Firing	Solvent Cleaning Machines	Stationary Combustion Equipment	Sulfuric Acid Batteries Maintenance	Surface Coatings	Vehicle maintenance exhaust	Welding	Wet Cooling Towers	Wood Chipper and Storage	Wood-working	X-Ray Processing	Total
Methylene diphenyl diisocyanate (MDI)	0	0	0	0	0	0	0	0	0	0	0	0	0	4.40E-03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.40E-03
4,4'-Methylenedianiline	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mineral fibers (fine)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Naphthalene	0	0	0	0	7.13E-05	3.94E-04	0	1.12E-07	6.12E-04	6.46E-07	0	0	0	0	0	0	0	0	0	0	0	0	3.98E-03	9.60E-04	0	0	1.00E-05	0	0	0	0	0	6.03E-03
Nickel Compounds	0	0	0	0	0	1.38E-03	0	0	0	0	0	0	0	1.09E-04	0	0	0	0	0	1.75E-04	0	0	0	6.766E-05	0	0	0	1.64E-05	0	0	0	0	1.75E-03
Nitrobenzene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4-Nitrobiphenyl	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4-Nitrophenol	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2-Nitropropane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N-Nitroso-N-methylurea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N-Nitrosodimethylamine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N-Nitrosomorpholine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Parathion	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pentachloronitrobenzene (Quintobenzene)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pentachlorophenol	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phenol	0	0	0	0	0	2.50E-04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.518E-06	0	0	0	0	0	0	0	0	0.000257
p-Phenylenediamine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phosgene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phosphine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phosphorus	0	0	0	0	0	0	0	0	0	0	0	0	0	5.25E-04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.25E-04
Phthalic anhydride	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychlorinated biphenyls (Aroclors)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polycylic Organic Matter	0	0	0	0	0	5.691E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.93E-03	0	0	1.96E-05	0	0	0	0	0	2.01E-03
1,3-Propane sultone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
beta-Propiolactone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Propionaldehyde	0	0	0	0	0	3.07E-04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000307
Propoxur (Baygon)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Propylene dichloride (1,2-Dichloropropane)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.16E-03	0	0	0	0	0	0	0	0	0	0	0	0	0	1.16E-03
Propylene oxide	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1,2-Propylenimine (2-Methyl aziridine)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Quinoline	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Quinone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Radionuclides (including radon)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Selenium Compounds	0	0	0	0	0	1.552E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.55E-05
Styrene	0	0	0	0	0	4.61E-03	0	0	0	0	0	0	0	2.90E-02	0	0	0	0	0	0	0	0	0	0	0	2.42E-03	0	0	0	0	0	0	3.61E-02
Styrene oxide	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2,3,7,8-Tetrachlorodibenzo-p-dioxin	0	0	3.60E-13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.6E-13
1,1,2,2-Tetrachloroethane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.06E-02	0	0	0	0	0	0	0	0	0	0	0	0	0	1.06E-02
Tetrachloroethylene (Perchloroethylene)	0	0	0	0	0	7.30E-03	0	0	0	0	0	0	0	4.59E-02	0	0	0	0	3.53E-02	0	0	0	0	0	0	0	0	0	0	0	0	0	8.85E-02
Titanium tetrachloride	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Toluene	0	0	0	0	5.36E-03	5.14E-03	0	1.78E-04	1.25E-03	3.99E-02	2.18E-02	0	5.46E-02	5.41E-01	0	0	0	0	8.66E-01	0	0	0	0	4.96E-03	0	7.28E-02	4.77E-05	0	0	0	0	0	1.61E+00
2,4-Toluene diamine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2,4-Toluene diisocyanate	0	0	0	0	0	0	0	0	0	0	0	0	0	2.53E-04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.53E-04
o-Toluidine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Toxaphene (chlorinated camphene)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1,2,4-Trichlorobenzene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1,1,1-Trichloroethane	0	0	0	0	0	8.26E-04	0	0	0	0	0	0	0	0	0	0	0	0	3.65E-03	0	0	0	0	0	0	0	0	0	0	0	0	0	4.48E-03
Trichloroethylene	0	0	0	0	0	0	0	0	0	0	0	0	0	9.32E-03	0	0	0	0	2.11E-02	0	0	0	0	0	0	0	0	0	0	0	0	0	3.04E-02
2,4,5-Trichlorophenol	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2,4,6-Trichlorophenol	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Triethylamine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trifluralin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2,2,4-Trimethylpentane	0	0	0	0	9.23E-04	0	0	3.73E-07	1.58E-05	3.90E-02	2.18E-02	0	1.84E-02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.01E-02
Vinyl acetate	0	0	0	0	0	4.80E-04	0	0	0	0	0	0	0	2.17E-04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.98E-04
Vinyl bromide	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vinyl chloride	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.61E-02	0	0	0	0	0	0	0	0	0	0	0	0	0	2.61E-02
Vinylidene chloride (1,1-Dichloroethylene)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Xylenes (isomers and mixture)	0	0	0	0	5.00E-03	3.84E-04	0	1.52E-04	2.47E-03	1.19E-02	6.22E-03	0	2.73E-02	5.11E-01	0	0	0	0	7.32E-02	0	0	0	0	3.87E-03	0	1.02E+00	3.31E-05	0	0	0	0	0	1.66E+00
o-Xylenes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
m-Xylenes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
p-Xylenes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total HAPs	0	0	6.35E-03	0	2.16E-02	8.82E+00	0	8.88E-04	6.04E-03	4.14E-01	2.29E-01	0	3.45E-01	3.66E+00	8.82E-04	0	0	0	1.29E+00	6.99E-04	0	3.47E-02	1.26E-02	4.60E-02	0	1.20E+00	1.30E-01	4.52E-03	0	0	0	0	16.2

Points Of Contact

Source Type	Building	Building Description	Contact	Telephone
Abrasive Blasting	2010	Rivet Mile	Mr. Ron Underwood	406 731-3163
Abrasive Blasting	870	Transportation	TSgt Richard Bayus	406 731-6083
Abrasive Blasting	1222	MWR	Mr. Ernie Mills	406 731-3263
Abrasive Blasting	200	Power Pro.	Mr. Jim Chestnutt	406 731-6124
Abrasive Blasting	3065/75	Missile Corrosion	Mr. Bill Schmitt	406 731-4279
Abrasive Blasting	1439	Missile PMT	SSgt Chris Lum	406 731-3242
Abrasive Blasting	910	Allied Trades	Mr. Randall Keirn	406 731-6335
Abrasive Blasting	407	Horizontal	Mr. Steve Martin	406 731-6462
Abrasive Blasting	471	Metal Shop	Mr. Henry Garten	406 731-6240
Abrasive Blasting	1248	Auto Hobby	Mr. Jim Heisler	406 731-3777
Asphalt Paving	407	Horizontal	Mr. Steve Martin	406-731-6462
Batteries Sulfuric	1439	Missile Maint.	SrA Fernando Rosete; MSgt William Kelly	406-731-4300
Coal Storage	82110	Heat Plant	Mr. Jerry Goodwin	406 731-6434
Expl. Ordin. Disp.	408	EOD	MSgt Scott Dalton	406 731-6896
External Combustion	82110	Heat Plant	Mr. Ken Koger	406 731-6434
External Combustion	471	HVAC	Mr. Frank Grieve	406 731-2618
External Combustion	470	Operations	Mr. Mike Murray	406 731-6142
Fire Training	349	Fire Department	Mr. Robert Garrison	406 731-3745
Fuel Spills	470	Environmental	Mr. Dave Heckler	406 731-7099
Fuel Storage/Transfer	1469	Fuels	Mr. Mike Foran	406 731-4320
Gas Stations	685	Bx Gas Station	Mr. Paul Clark	406 761-7333
Heavy Construction	407	Horizontal	Mr. Steve Martin	406 731-6462
Heavy Construction	Base	Red Horse	Sgt Rod Madison	406 731-4610
Incinerators	547	Classified Document	Mrs. Marty Stephens	406 731-2266
Landfills	470	Env. Flight	Mr. Jim Hodges	406 731-7126
Military Gas Sta.	448	Military Gas Station	Mr. Mike Foran	406 731-4320
Miscellaneous Chemical Use	410	HAZMART	Mr. Don Delorme	406 731-6032
Miscellaneous Chemical Use	1439/3080	Missile Wing Material Control (LSS LGLOM 230MP)	Mr. Pat Merrill	406 731-4247
Pesticides	473	Entomology	MSgt Jim Jeffers	406 731-7057
Pesticides	473	Entomology	Sgt Coffman	406 731-7057
Photographic	300	Photo	MSgt Gilliam Albro	406 731-2410
Site Restoration	470	Env. Flight	Mr. Jim Hodges	406 731-7126
Small Arms Firing	1895	Firing Range	SSgt Mick Jones	406 731-7589
Solvent Cleaning and Reclamation	1708	Env. Flight	Mr. Jim Morris; Mr. Troy Morris (Safety-Kleen)	406 731-6440
Stationary Internal/Combustion	200	Power Pro	Mr. Jim Chestnutt	406 731-6124
Stationary Internal/Combustion	160	Red Horse	MSgt Rod Madison	406 731-4610

Points Of Contact (continued)

Source Type	Building	Building Description	Contact	Telephone
Stationary Internal/Combustion	B471/B4 & C	Fuels/Military Gas Station	Sgt Schafer	406 731-6039
Surface Coating	1248	Auto Hobby	Mr. Randall Keirn	406 731-6335
Surface Coating	471	Sign Shop	Mr. Cliff Holmes	406 731-6568
Surface Coating	910	Allied Trader	Mr. Randall Keirn	406 731-6335
Surface Coating	3065/75	Missile Corrosion	Mr. Bill Schmitt	406 731-4279
UST's	470	Environmental	Mr. Jim Hodges	406 731-7126
Welding	400	Supply	Mr. Willie Reese	406 731-6575
Wet Cooling Tower	HVAC 471 for Bldg. 500	Bldg. 500	Mr. Hank Wilczek	406 731-2618
Woodworking	471	Vertical	TSgt Mark Boser	406 731-6227
Woodworking	1248	Consolid. Skills	Mr. Eddie Bilcek	406 731-3641
Woodworking	800	TMO	Mr. Thomas Cote	406 731-6291
Woodworking	1447	Red Horse	Sgt Rod Madison	406 731-4610
X-Ray Processing	2040	Dental	TSgt Karen Georgio	406 731-2846
X-Ray Processing	2040	Clinic Biology	TSgt Robert Olson	406 731-4415

References

- Det 1, HSC/OEBQ, "Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations," May 1999
- 40 CFR 50, National Primary and Secondary Ambient Air Quality Standards
- 40 CFR 51, Requirements for Preparation, Adoption, and Submittal of Implementation Plans
- 40 CFR 60, Standards of Performance for New Stationary Sources
- 40 CFR 61, National Emission Standards for Hazardous Air Pollutants
- 40 CFR 63, National Emission Standards for Hazardous Air Pollutants for Sources Categories
- 40 CFR 70, State Operating Permit Program
- U.S. Environmental Protection Agency, "Compilation of Air Pollution Emission Factors," AP-42, 5th ed., Jan 95, as amended by Supplements A-D
- U.S. Environmental Protection Agency, Factor Information Retrieval System Database (FIRE), Version 5.1B, December 1996
- U.S. Environmental Protection Agency, Volatile Organic Compound/Particulate Matter Speciation Database (SPECIATE), Version 1.5, October 1992
- U.S. Environmental Protection Agency, Storage Tank Emissions Calculations Software (TANKS), Version 3.1
- U.S. Environmental Protection Agency, Clearinghouse for Inventories and Emission Factors "Air CHIEF" Database
- U.S. Air Force Armstrong Laboratory, "Calculation Methods for Criteria Air Pollutant Emission Inventories," Report No. AL/OE-TR-1994-0049, Jul 94
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- Emissions Inventory Improvement Program (EIIP), Volumes II and III
- Reasonably Available Control Measures for Fugitive Dust Sources, Ohio EPA, September 1980

- National Weather Service, Great Falls, Montana, via Internet (**www.wth.noaa.gov**), 8/2000

- Climatic Atlas of the United States

- U.S. Environmental Protection Agency, Protocol for Equipment Leak Emission Estimates, EPA-453/R-95-017, November 1995

- Environmental Quality Management, Inc., Emissions Testing of Fire Fighter Training Facility – Goodfellow AFB Texas, January 1998

- American Petroleum Institute, Manual of Petroleum Measurements Standards – Recommended Practice for Speciation of Evaporative Losses, First Edition, November 1997

- U.S. Air Force Armstrong Laboratory, Environmental Research Division (AL/EQL), JP-8 Composition and Variability, Report #AL/EQ-TR-1996-0006, May 1996

- U.S. Environmental Protection Agency, Technical Support Document for Development of Comparable Fuel Exemption, Draft Version, February 1996

- CHEMDAT8 Model, U.S. Environmental Protection Agency, EPA-453/C-94-08 OB, November 1994

- U.S. Army Defense Ammunition Center, Munitions Items Disposition Action System (MIDAS), Central Library Version 74, 1 May 1998

- Methodology and Technology for Identifying and Quantifying Emission Products from Open Burning and Open Detonation Thermal Treatment Methods, Field Test Series A, B, and C, Volume 1 – Test Summary, January 1992

- Title 40 Code of Federal Regulations Part 82 (40 CFR 82), "Protection of Stratospheric Ozone"

- U.S. Environmental Protection Agency's Significant New Alternatives Policy (SNAP) Program

- Landfill Air Emissions Estimation Model, Version 1.1, U.S. Environmental Protection Agency, September 1997

- Air Emissions Assessment Report Title V Air Emissions Inventory for 1996, Malmstrom Air Force Base, Montana, Earth Tech, April 1998

- U.S. Environmental Protection Agency, Office of Mobile Sources, Average Life, Annual Activity, and Load Factor Value for Nonroad Engine Emissions Modeling, Report No. NR-005, December 1997

- U.S. Air Force, Application and Removal of Organic Coatings, Aerospace and Non-Aerospace Equipment, Technical Order 1-1-8, September 1989
- U.S. Environmental Protection Agency, Guideline Series: Control of Volatile Organic Compound Emissions from Coating Operations of Aerospace Manufacturing and Rework Operations, EPA-453/R-97-004, December 1997
- Ron Joseph & Associates, Inc., Environmental Paints and Coatings Training Program for United States Air Force
- Radian Corporation, 1994 Air Pollutant Emissions Inventory for Holloman Air Force Base, New Mexico, 13 November 1995

SECTION 2

ABRASIVE BLASTING

Source Description

Abrasive blasting operations involve the use of a hard material such as plastic beads, or glass beads to remove old paint and/or corrosion from equipment. A high pressure gun is used to blast the beads at the equipment being stripped. Air emissions associated with the blasting operations contain particulates and may contain inorganic HAPS, dependant upon the nature of the blasted material. The following abrasive blasting operations are maintained on base:

Building Number	Building Desc.	Blast Unit Type	Control Device
200	Power Pro	Glass beads	Vacuum System
471	Metal Shop	Glass beads	Cabinet/Cyclone
870	Transportation	See note below	
1222	MWR	Glass beads	Filter
1248	Auto Hobby	Glass beads	Cyclone
1890	Rivet Mile	Sponge media	Bag Filter
1890	Rivet Mile	Glass beads	Bag Filter
3075	Missile Corrosion	Plastic beads	Cabinet/Reclaimer
81120	Heat Plant	Glass beads	Filter/Cyclone

Note: Building 870 reported negligible use of blasting material in 1999.

The two-digit SIC Code which includes abrasive blasting is 97, National Security and International Affairs; the SCC Code is 3-09-002-99, Abrasive Blasting of Metal Parts - General (sand and plastic abrasives).

Actual Emissions

Actual emissions were calculated as discussed in emission calculations for controlled operations, outlined in Section 2 of the AEI Guidance Document. The amount of waste material collected was obtained from various base personnel. Once this information was known, the total mass of waste material exhausted to the control equipment (WMtotal) was calculated by dividing the amount (mass) of waste material collected (WMcol) by the efficiency of the control equipment (eff) for each abrasive blasting operation.

$$WMtotal = (WMcol)/(eff/100)$$

The emission rate was then calculated by subtracting the collected material from the total material.

$$Epm = WMtotal - WMcol$$

For example, for Building 81120 a total of 170 gallons of waste associated with the glass bead blaster were disposed in 1999. Glass beads and waste material are assumed to have a density of 15 lbs/gallon. Building 81120 therefore collected 2,550 pounds in 1999 (WMcol). An efficiency of 98% was assumed for the cyclone/filter system associated with Building 81120.

$$WMcol = 170 \text{ gallons} * 15 \text{ lbs/gallon} = 2{,}550 \text{ lbs}$$

$$WMtotal = (WMcol)/(eff/100)$$
$$WMtotal = 2{,}550 \text{ lb}/(98/100) = 2{,}602 \text{ lbs}$$

$$Epm = WMtotal - WMcol = 2{,}602 - 2{,}550 \text{ lbs} = 52 \text{ lbs.}$$

For emission units where only the amount of material used in 1999 was known as opposed to the amount of material disposed, this was multiplied by the control efficiency to determine the amount collected. The remaining emissions were calculated in a similar fashion. Additional calculations and summary of emissions are included in the attached calculation worksheet.

Potential Emissions

Potential emissions were calculated as discussed in Section 37.2 of the Draft AEI Guidance Document. In essence, abrasive blasting is a maintenance activity in support of base operations. Therefore, because the base operations were approximately 2,080 hours annually, this was scaled up by a factor of 4.2 to reach potential base operating hours of 8,760 annually. Therefore, actual emissions associated with abrasive blasting were multiplied by 4.2 to obtain potential blasting emissions.

Reference

1. U.S. Air Force Bioenvironmental Engineering Division, Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations, Brooks Air Force Base, TX 78235-5114, May 1999.

2. U.S. Environmental Protection Agency, Compilation of Air Pollutant Emission Factors – Volume 1: Stationary Point and Area Sources (AP-42), Section 13.2.5, September 97.

Client:	Malmstrom AFB	**Date:**	08/16/00
Location:	Buildings 200, 471, 870, 1222, 1248, 1450, 1890, 3075, 81120	**Emissions:**	Actual and Potential
Subject:	Abrasive Blasting	**Calc. by:**	*SSR*

Calculate total amount of waste material exhausted to control device:

Variables:
1. Total amount of waste material exhausted to fabric filter (lb/yr)= **WMtotal**
2. Amount of waste material captured by the fabric filter (lb/yr)= **WMcol**
3. Efficiency of fabric filter (%) = **eff**
4. **WMtotal = WMcol/(eff/100)**

Calculate the PM emission rate (Epm) by subtracting amount of waste material collected from the total amount of airborne waste entering the control device:

5. **Epm = WMtotal - WMcol**

Building Location	Type	Type of bead	Control device	Control Efficiency (eff) %	WMcol (gal/yr)	WMcol (lbs/yr)[a]	WMtotal (lbs/yr)	Actual E_{pm} (lbs/yr)	Potential E_{pm} (lbs/yr)[b]
200	Inex	Glass	Vacuum system	80	20.0	300.00	375.00	**75.00**	**315.00**
471		Glass	Cabinet/Cyclone	80	110.0	1650.00	2062.50	**412.50**	**1732.50**
870[c]	--	--	--	--	--	--	--	--	--
1222	Snap-On Bead	Glass	Filter	98		49.00	50.00	**1.00**	**4.20**
1248		Glass	Cyclone	80	---	160.00	200.00	**40.00**	**168.00**
1890	Sponge Blast	Sponge	Bag Filter	98	839	4488.65	4580.26	**91.61**	**384.74**
1890		Glass	Bag Filter	98		1470.00	1500.00	**30.00**	**126.00**
3075	Aerolyte	Plastic	Cabinet/Reclaimer	80	180	963.00	1203.75	**240.75**	**1011.15**
81120		Glass	Particulate Filter/cyclone	98	170	2550.00	2602.04	**52.04**	**218.57**
							Totals:	**942.90**	**3960.16**
							Tons/year:	**0.47**	**1.98**

a - The density of glass beads was assumed to be 15 lb/gal, while the density of plastic beads is approximately 5.35 lb/gal.
The density of the sponge blast media was assumed to be the same as plastic beads.
Total pounds wasted per building was calculated by multiplying the respective densities by total gal from that building.
Where only the amound of media used was known as opposed to the amount collected this was used with the control effiiciency to determine the amount collected and thus released.
b- Actual emissions are multiplied by a factor of 4.2 correlating current base operations of 2080 hours annually to 8760 hours per year.

c-The abrasive blasting unit in Bldg 870 did not use a significant amount of blasting material in 1999 per TSgt. Richard Bayus.

Note: PM10 emissions are assumed to be 85% of the total PM emissions.

SECTION 3

ASPHALT PAVING OPERATIONS

Source Description

Asphalt operations at MAFB consist of asphalt road repair/construction. Asphalt surfaces are composed of compacted aggregate (stones, gravel, etc.) and an asphalt binder. Asphalt binders may be in the form of asphalt cement or liquified asphalt. Liquified asphalt comes in two types, cutback asphalt and emulsified asphalt. From an emissions standpoint, cutback asphalt, an asphalt cement which has been thinned or "cut back," is the only asphalt of concern. Asphalt paving operations at Air Force Bases are included in the two-digit SIC 97 for National Security and International Affairs. There is no appropriate SCC code for asphalt paving operations.

Actual Emissions

The asphalt used at MAFB is not a cutback asphalt and produces negligible VOC emissions per Montana Refinery Company, the asphalt supplier.

Potential Emissions

Potential emissions from asphalt paving are negligible since the same type of asphalt product is intended to be used for future products.

References

1. U.S. Air Force Bioenvironmental Engineering Division, Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations, Brooks Air Force Base, TX 78235-5114, May 1999.

2. U.S. Environmental Protection Agency, Compilation of Air Pollutant Emission Factors - Volume I: Stationary Point and Area Sources (AP-42), Section 4.5, July 1979 (Reformatted January 1995).

3. Emissions Inventory Improvement Program (EIIP), Volume III: Chapter 17, "Asphalt Paving," Draft Version, May 1998.

Client:	Malmstrom AFB	**Date:**	10/31/2000
Location:	Base Wide	**Emissions:**	Actual
Subject:	Asphalt Paving Operations	**Calc by:**	*SSR*

United Materials of Great Falls, a main supplier of asphalt for paving projects at Malstrom AFB, indicated that Performance Grade Unmodified Asphalt and Polymer Modified Performance Grade Asphalt are the asphalts used by their operations. The MSDS indicated that no volatile compounds were present in either product. A phone conversation with technical personnel at Montana Refining Company indicated that these were not cutback asphalts and that there were no known VOC emissions from either product even after heating.

The AEI Guidance document confirms this by indicating that VOC emissions primarily come from cutback asphalts not emulsified asphalts or asphalt cements.

Based on this information it was concluded that any paving performed at Malmstrom AFB did not result in a release of VOCs.

SECTION 4

CLASSIFIED DOCUMENT INCINERATOR

Source Description

Classified document incineration is performed at MAFB to dispose of classified materials. Classified document incineration is included in the two-digit SIC Code 97 for National Security and International Affairs; the SCC Code is 5-01-005-05, "Solid Waste Disposal/Government/ Other Incineration."

Actual Emissions

Actual emissions for criteria pollutants (CO, NO_X, PM, PM_{10}, SO_X, and VOC) and HAPs (dibenzofurans, hydrogen chloride, and 2,3,7,8-TCDD) were calculated by multiplying the amount of waste combusted times the appropriate emission factor. Because the EPA does not have emission factors specifically for classified waste incineration, the category of "Industrial/Commercial Combustors" is recommended by the AEI guidance. The classified waste incinerator is a dual chamber unit and was operated three times during 1997 for a total of nine hours, incinerating 605 pounds of material. Actual emissions can be seen in the attached calculation worksheet.

Potential Emissions

Potential emissions from classified paper incineration are scaled up by a ratio of 4.2 from correlating current base operations of 2,080 hours annually to 8,760 hours per year. Potential emissions can be seen in the attached calculation worksheet.

Reference

1. U.S. Air Force Bioenvironmental Engineering Division, Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations, Brooks Air Force Base, TX 78235-5114, May 1999.

2. U.S. Environmental Protection Agency, Compilation of Air Pollutant Emission Factors – Volume I: Stationary Point and Area Sources (AP-42), Section 2.1, October 1996.

Client: Malmstrom AFB
Location: Building 547
Subject: Classified Waste Incinerator[a]

Date: 10/04/00
Emissions: Actual and Potential
Calc. by: *SSR*

Basis:
1. Emissions of particular pollutant (lb/yr) — E_{pol}
2. Quantity of waste combusted (tons/yr) — WC
3. Emission factor (lb/ton) — EF[b]

$E_{pol} = WC * EF$

Building Location	Incinerator Type	Model No.	Manufacturer	Rated Capacity (lb/hr)	Loads Burned (No./yr)	Quantity Burned (lbs/yr)	WC (tons/yr)	1999 Operating Hours	Control Device	Pollutant	EF (lb/ton)	Actual E_{pol} (lb/yr)	Potential E_{pol}[c] (lb/yr)
547	Dual Chamber	C-120	Consumat	435-560 (120 cf)	3	605	0.3025	3 hrs/day 3 days/yr	None	CO	10	3.03	12.705
										NOx	3	0.908	3.8115
										Total PM	7	2.12	8.8935
										PM10	4.7	1.42	5.97135
										SOx	2.5	0.756	3.17625
										VOC	3	0.908	3.8115
										Dibenzofurans	1.29E-06	3.90E-07	1.6389E-06
										Hydrogen Chloride	10	3.03	12.705
										2,3,7,8-TCDD	5.66E-10	1.71E-10	7.191E-10

(a) "Classified Waste" includes classified documents, misc. paper waste, mylar tape and ribbons.
(b) Emission factors for multiple chamber waste incinerators taken from AEI Guidance Document, "Table 17-2. Emission Factors for Uncontrolled Industrial/Commercial Combustors".
(c) Potential emissions are equal to actual emissions increased by 4.2, a scale-up ratio from actual base operating hours of 2080 annually to 8760 hours per year.

SECTION 5

COAL STORAGE AND HANDLING

Source Description

MAFB receives coal at the Central Heating Plant (CHP) as fuel for boilers. The coal is delivered via railcar. The coal is dumped from the car into a pile. The coal is transferred from the pile to the CHP via enclosed conveyor. Coal storage and transfer at Air Force Bases are included in the two-digit SIC Code 97 for National Security and International Affairs. There are no appropriate SCC codes for coal storage piles and transfer at Air Force Bases.

Actual Emissions

Data for calculating emissions from coal storage and transfer were obtained from MAFB CHP personnel. In the AEI Guidance Document, there is no section for emissions from storage piles or coal transfer. Therefore, AP-42 Section 13.2.4, Aggregate Handling and Storage Piles emission factors were used to estimate emissions from transfers and Ohio EPA's "Reasonably Available Control Measures for Fugitive Dust Sources" was used to estimate emissions from wind erosion of the storage pile. Detailed calculation sheets provide the basis for all parameters and assumptions used (e.g., wind speed, silt content, etc.). Based on this methodology, 1999 particulate emissions are 18.1 lb/yr.

Potential Emissions

Potential emissions from coal storage and transfer were estimated by multiplying by a scaling factor based on the ratio of potential operating hours (8,760 hours per year) to actual operating hours (2,080 hours in 1999) or a factor of 4.2. Based on this methodology, potential particulate emissions are 76.1 lb/yr.

References

1. U.S. Environmental Protection Agency, Compilation of Air Pollutant Emission Factors - Volume I: Stationary Point Source (AP-42), Section 13.2.4, January 1995.

2. Reasonably Available Control Measures for Fugitive Dust Sources, Ohio EPA, September 1980.

3. Average wind speed and rainfall data. National Weather Service, Great Falls, Montana, via internet (www.wrh.noaa.gov), 8/2000.

4. Excessive wind speed. Climatic Atlas of the United States.

Client:	Malmstrom AFB	Date:	10/9/00
Location:	Coal storage and handling	Emissions:	Actual and Potential
Subject:	Coal dust emissions from handling and storage	Calc by:	*DDM*

*Total Emissions = Material Load-in + Wind Erosion + Material Load-out

Material Information:

Property	Value		Reference
Material Silt Content, wt %	2.2	{S}	AP-42 Table 13.2.4-1 for coal-fired power plant
Material Surface Moisture Content, wt %	4.5	{M}	AP-42 Table 13.2.4-1 for coal-fired power plant
Mean Wind Speed, mph	12.3	{U}	Nat. Weather Service Office,
Particle size multiplier for PM-10	35	{k}	AP-42 Section 13.2.4
Duration of Material in Storage, days	87	{D}	Engineering calculation, see below
Number of Dry days/year	264	{d}	Nat. Weather Service Office, Great Falls
Percent of Time Wind Speed Exceeds 13 mph	50	{f}	Climatic Atlas of the US
Throughput of the Pile, tons	5,014		Use 50 tpd average (Jerry)
Average Size of Storage Pile, tons	1,200		Facility information (Jerry)
Potential emissions scaling factor (8760hours/2080 hours actual)	4.2		

Calculation of average duration of material in storage:

Number of pile turnovers per year = Tons throughput / tons pile capacity

Number of days in 1 turnover period = 365 days/year / turnovers/year

Material load-in/out emissions:

E = k (0.0032) (U/5)1.3/(M/2)1.4, lb/ton

where, k= aerodynamic particle size multiplier, dimensionless
U = mean wind speed
M = material moisture content, %

Wind erosion emissions*:

E = 0.05 x (S/1.5) x (D/90) x (d/235) x (f/15), lb/ton

where, S = silt content, %
D = duration of material in storage, days
d = number of dry days during the year, days
f = % of time wind speed over 13 mph, %

Client:	Malmstrom AFB	Date:	10/9/00
Location:	Coal storage and handling	Emissions:	Actual and Potential
Subject:	Coal dust emissions from handling and storage	Calc by:	*DDM*

Emission Calculations:

Activity	PM Emission Factor Uncontrolled lb/ton	Emission Factor Reference	Uncontrolled Particulate Emissions lbs/yr	Description
Coal Storage Pile				
Material Load-In	0.0033	AP-42, Section 13.2.4	16.62	Train - car belly drops into pile
Wind Erosion	0.2665	OEPA RACM Doc., Sect. 2.1.2*	0.67	None
Material Loadout (95% control (from enclosed conveyor)	0.0033	AP-42, Section 13.2.4	0.83	Transfer to boiler via enclosed conveyor
TOTAL:		Actual particulate, lbs/yr =	**18.1**	
		Actual particulate, tons/yr =	**0.01**	
		Potential particulate, lbs/yr =	**76.1**	
		Potential particulate, tons/yr =	**0.04**	

* Reasonably Available Control Measures (RACM) for Fugitive Dust Sources, Ohio EPA, (9/80)

SECTION 6

EQUIPMENT LEAKS

Source Description

The only equipment present at Malmstrom AFB with the potential for volatile emissions associated with equipment component leaks is JP-8, diesel, and gasoline system piping and transfer equipment. The fuel transfer systems consists of pipelines from tank truck to storage tanks and from the storage tanks to distribution. Within this system are numerous pumps, valves, sampling connections, flanges, etc., from which fugitive emissions may leak. An inventory of piping equipment was developed based on information from Mr. Mark Foran and a physical count of components in each system.

The applicable two-digit SIC Code for this operation is 97 for National Security and International Affairs. Applicable SCC Codes are included under 3-06-008, Petroleum Industry, Fugitive Emissions. Specific system components are further broken down into individual SCC codes as follow:

- Valves: 3-06-008-12, Pipeline Valves: Light Liquids (gasoline)
- Valves: 3-06-008-13, Pipeline Valves: Heavy Liquids (includes both JP-8 and diesel)
- Pumps: 3-06-008-17, Pump Seals: Light Liquid Streams
- Pumps: 3-06-008-18, Pump Seals: Heavy Liquid Streams
- Relief Valves: 3-06-008-22, Vessel Relief Valves: All Streams
- Sample Connections: 3-06-008-21, Drains, All Streams
- Flanges: 3-06-008-16, All Streams

In addition, the following SCC code may be applied: 4-04-001-51, Bulk Terminals, Valves, Flanges, and Pumps.

Actual Emissions

Actual emissions were calculated as discussed in Section 7.2 of the AEI Guidance Document. Emission factors for VOCs from equipment leaks were provided in Table 7-1 of the AEI Guidance Document. These emission factors were based on emission factors for marketing terminals included in the EPA document titled "Protocol for Equipment Leak Emission Estimates" (EPA-453/R-95-017, Nov 95). Each emission factor is specific to the type of equipment component and to the service category (fuel/chemical type). The leaks were assumed to occur in the fuel's liquid phase.

VOC leak emissions were calculated by multiplying the time the specific equipment was in operation during the year by the applicable emission factor. The fuel transfer systems are in

operation continuously in 1999 (8760 hours/yr). Groups of equipment components were identified for multiplication with the respective emission factor.

For example, the JP-8 distribution system has 22 valves. Therefore, the number of components (NC) was 22. The emission factor (EF) for valves is 9.5 x 10^{-5} lb/hr/source. Time (t) was 8,760 hrs in 1999. The emission was then calculated as follows:

$$E = NC * t * EF$$
$$E = 22 \text{ sources} * 8{,}760 \text{ hours/yr} * 9.5 \times 10^{-5} \text{ lb/hr/source}$$
$$E = 18.31 \text{ lb/yr}$$

Similar calculations were performed for the remaining components: relief valves, pumps, flanges, and sample connections . Additional calculations and summary of emissions are included in the attached calculation worksheet.

Potential Emissions

Potential emissions were calculated as discussed in Section 37.2 of the AEI Guidance Document. In essence, equipment leak emissions are calculated based on time that the fuel equipment is in operation. Because the operation is continuous, potential and actual emissions are equal.

References

1. U.S. Environmental Protection Agency, Protocol for Equipment Leak Emission Estimates, EPA-453/R-95-017, November 1995.

2. Emissions Inventory Improvement Program (EIIP), Volume II: Chapter 4, "Preferred and Alternative Methods for Estimating Fugitive Emissions from Equipment Leaks," November 1996.

3. U.S. Air Force Bioenvironmental Engineering Division, Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations, Brooks Air Force Base, TX 78235-5114, May 1999.

Client:	Malmstrom AFB	**Date:**	8/22/00
Location:	Fuel Transfer systems	**Emissions:**	Actual and Potential
Subject:	Equipment Leaks	**Calc. by:**	*DDM*

***Objective:* Calculate VOC emissions from fuel equipment components.**

Variables:

1. VOC Emissions (lb/yr) = **E_{voc}**
2. Number of similar components located on base (# of similar emission sources) = **NC**
3. Time during the year in which all similar components were in operation (hr/yr) = **t**
4. Emission Factor (lb/hr/source) = **EF**
5. Emissions of a HAP constituent in the fuel (lb/yr) = **Ehap**
6. Weight percentage of the HAP Constituent in the fuel vapor = **%HAP**

Step 1: Calculate total VOC leak emissions through equation Evoc = NC * t *EF

JP-8 System

Component Type	NC[a]	t (hr/yr)	EF[b] (lb/hr/source)	Actual and Potential E_{voc} (lb/yr)[c]
Valve	22	8760	9.5E-05	18.31
Pump	5	8760	1.2E-03	52.56
Relief valve	26	8760	2.9E-04	66.05
Sample connection	12	8760	2.9E-04	30.48
Flanges	130	8760	1.8E-05	20.50
			Total VOC (lb/yr):	**187.90**

Diesel System

Component Type	NC[a]	t (hr/yr)	EF[b] (lb/hr/source)	Actual and Potential E_{voc} (lb/yr)[c]
Valve	21	8760	9.5E-05	17.48
Pump	7	8760	1.2E-03	73.58
Relief valve	6	8760	2.9E-04	15.24
Sample connection	5	8760	2.9E-04	12.70
Flanges	78	8760	1.8E-05	12.30
			Total VOC (lb/yr):	**131.30**

Gasoline system

Component Type	NC[a]	t (hr/yr)	EF[b] (lb/hr/source)	Actual and Potential E_{voc} (lb/yr)[c]
Valve	9	8760	9.5E-05	7.49
Pump	3	8760	1.2E-03	31.54
Relief valve	1	8760	2.9E-04	2.54
Sample connection	0	8760	2.9E-04	0.00
Flanges	26	8760	1.8E-05	4.10
			Total VOC (lb/yr):	**45.67**

(a) Based on information from Mark Foran combined with physical inspection of system.
(b) AEI Guidance Document, "Table 7-1 VOC Emission Factors for Equipment Leaks."
(c) Emissions from equipment leaks are based on the amount of time the fuel transfer equipment is in operation. Since the fuel transfer equipment is in continuous operation, actual and potential emissions are equivalent.

Client:	Malmstrom AFB	Date:	8/22/00
Location:	Fuel Transfer systems	Emissions:	Actual and Potential
Subject:	Equipment Leaks	Calc. by:	*DDM*

***Step 2:* Calculate emissions of specific HAP constituents using equation $E_{HAP} = (E_{VOC} * 6/7 * (\%HAP_{JP\text{-}8}/100)) + (E_{VOC} * 1/7 * (\%HAP_{diesel}/100))$**

	%HAP[d]								
	Benzene	Cumene	Ethylbenzene	Naphthalene	Toluene	2,2,4 - Trimethylpentane	Xylenes	Hexane (n-hexane)	Methyl tert-butyl ether
Vapor-Phase Speciation of JP-8	0.613	0.330	0.271	0.003	1.143	0.010	1.877	0	-
Vapor-Phase Speciation of Diesel	7.200	0.400	0.700	0	4.100	0	2.500	2.300	-
Vapor-Phase Speciation of Gasoline	1.800	0.500	1.400	0.300	7.000	4.000	7.000	1.000	4.500

(d) AEI Guidance Document, "Table 13-2. Liquid-phase and Vapor-phase Speciation of JP-8 and ."
and "Table 15-2. Liquid-Phase and Vapor-Phase HAP Speciation of Gasoline".

JP-8 System

		Actual and Potential E_{HAP} (lb/yr) [e]								
System (all components)	E_{voc} (lb/yr)	Benzene	Cumene	Ethylbenzene	Naphthalene	Toluene	2,2,4 - Trimethylpentane	Xylenes	n-Hexane	Methyl tert-butyl ether
JP-8 System	187.90	115.2	62.0	50.9	0.6	214.8	1.9	352.7	0	-
Diesel System	131.30	945.4	52.5	91.9	0	538.3	0	328.3	302.0	-
Gasoline System	45.67	82.2	22.8	63.9	13.7	319.7	182.7	319.7	45.7	205.5
Totals (lb/yr):	364.87	1142.77	137.36	206.77	14.26	1072.78	184.54	1000.61	347.66	205.50
Totals (ton/yr):	0.18	0.571	6.87E-02	1.03E-01	7.13E-03	0.536	9.23E-02	0.500	1.74E-01	1.03E-01

(e) Emissions from equipment leaks are based on the amount of time the fuel transfer equipment is in operation.
Since the fuel transfer equipment is in continuous operation, actual and potential emissions are equivalent.

SECTION 7

EXTERNAL COMBUSTION SOURCES

Source Description

External combustion sources at Malmstrom Air Force Base include boilers and furnaces used for power and/or heating purposes in buildings throughout the base. They are included in the two-digit SIC Code 97 for National Security and International Affairs. These combustion sources burn coal, natural gas, and/or waste-oil. The following table provides the type of combustion unit and SCC Code.

Type of Unit	Fuel Fired	Maximum Heat Input	SCC	Number of Units at Malmstrom AFB
Boiler	Coal	85 MMBtu/hr	1-02-002-05	1
Boiler	Coal/natural gas	85 MMBtu/hr	1-02-002-05	1
Boiler	Natural gas	35 MMBtu/hr	1-02-006-02	1
Small burner	Waste oil	0.3 to <10 MMBtu/hr	1-03-013-02	1
Hot water boilers	Natural Gas	< 0.3 MMBtu/hr	1-05-002-06	4
Furnace/hot water heaters	Natural Gas	0.3 - <10 MMBtu/hr	1-05-002-06	18
Small steam boiler	Natural Gas	10 to 100 MMBtu/hr	1-02-006-02	1

Actual Emissions

Actual emissions from the external combustion sources were estimated by multiplying the amount of fuel combusted in each unit by the appropriate emission factor found in Section 9 of the AEI Guidance Document. Boilers No. 1 and No. 3 in the Central Heating Plant (CHP) utilize dry lime scrubbers and baghouses for emission control. Criteria pollutant emission factors for natural gas combustion were taken from Tables 9-23 and 9-24. Criteria pollutant emission factors for coal combustion were taken from Tables 9-3 and 9-4. HAP emission factors for natural gas combustion were taken from Table 9-25. HAP emissions factors for coal combustion were taken from Tables 9-7 and 9-11. Tables 9-27, and 9-28 were used for waste oil combustion.

CHP boiler natural gas and coal usage was obtained from Mr. Ken Koger and Mr. Jerry Goodwin. Base-wide natural gas consumption data (except for Central Heating Plant boilers) was provided by Mr. Dave Heckler. The total natural gas usage was divided among all natural

input for one unit divided by the total maximum heat input for all units and multiply this ratio by the total natural gas used on the base. The result is an estimate of the natural gas burned in that particular unit. The quantity of waste oil burned in 1999 was provided by Sergeant Bates (X6083)

Potential Emissions

Potential emissions from the external combustion units (excluding waste oil burner) were estimated based on permit limits and corresponding maximum fuel usage or based on design limitations and downtime for routine maintanence. Design limitations estimate that each unit operated at 90% of its respective maximum rated capacity for heat input. Maintenance activities account for an estimated 15% of a unit's operating hours.

Permit limits were used to estimate emissions for CHP units. Emissions from other units were estimated by multiplying the maximum heat input rate in MMBtu/hr by 0.9 to determine each units' design limitation. This value was multiplied by 7,446 operating hours in a year to obtain the potential number of MMBtu each unit can burn. The operating hours subtract downtime for routine maintenance. This value was then divided by the heating value of the fuel that is burned in that unit to estimate the potential amount of fuel that unit can burn in a year. The heating values were taken from Table 9-2 in the AEI Guidance Document. Using the potential fuel usage for a year and the same emission factors discussed above, an estimate of potential emissions was calculated.

Potential emissions from the waste oil burner were estimated by utilizing a scaling factor based on the ratio of potential operating hours (8,760 hours per year) to actual operating hours (2,080 hours in 1999) or a factor of 4.2.

References

1. U.S. Environmental Protection Agency, Compilation of Air Pollutant Emission Factors – Volume I: Stationary Point and Area Sources (AP-42), Chapter 1, October 1996.

2. U.S. Environmental Protection Agency, Factor Information Retrieval System (FIRE), Version 5.1B, December 1996.

3. Emissions Inventory Improvement Program (EIIP), Volume II: Chapter 2, "Preferred and Alternative Methods for Estimating Air Emissions from Boiler," June 1996.

4. Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations, Section 9, May 1999.

Client:	Malmstrom AFB	**Date:**	10/27/2000
Location:	Base-wide	**Emissions:**	1999 Actual
Subject:	External Combustion - Coal-fired units	**Calc by:**	*DDM*

Parameter	Quantity	Units	Basis
1. Emission Factors for Coal-fired (Roto-grate or travelling grate spreader stoker)			
Uncontrolled coal combustion factors (overfeed stoker includes travelling grate)			
PM	16	lb/ton	Tables 9-3 AEI Guidance Document
PM_{10}	6	lb/ton	Tables 9-3 AEI Guidance Document
NO_x	7.5	lb/ton	Tables 9-4 AEI Guidance Document
SO_x	38	lb/ton	Tables 9-3 AEI Guidance Document
CO	6	lb/ton	Tables 9-3 AEI Guidance Document
VOC	0.05	lb/ton	Tables 9-3 AEI Guidance Document
2. HAP emission factors for bituminous and subbituminous coal combustion			
Arsenic	2.04E-02	lb/ton	Table 9-7 AEI Guidance Document
Beryllium	ND	lb/ton	Table 9-7 AEI Guidance Document
Cadmium	1.63E-03	lb/ton	Table 9-7 AEI Guidance Document
Chromium	ND	lb/ton	Table 9-7 AEI Guidance Document
Lead	1.32E-02	lb/ton	Table 9-7 AEI Guidance Document
Manganese	ND	lb/ton	Table 9-7 AEI Guidance Document
Mercury	ND	lb/ton	Table 9-7 AEI Guidance Document
Nickel	ND	lb/ton	Table 9-7 AEI Guidance Document
Polycyclic Organic Matter	ND	lb/ton	Table 9-7 AEI Guidance Document
Formaldehyde	2.40E-04	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
HCl	1.20E+00	lb/ton	Table 9-11 AEI Guidance Document
HF	1.50E-01	lb/ton	Table 9-11 AEI Guidance Document
Acetaldehyde	5.70E-04	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
Acetophenone	1.50E-05	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
Acrolein	2.90E-04	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
Benzene	1.30E-03	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
Benzyl chloride	7.00E-04	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
Biphenyl	1.70E-06	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
Bis(2-ethylhexyl)phthalate (DEHP)	7.30E-05	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
Bromoform	3.90E-05	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
Carbon disulfide	1.30E-04	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
2-chloroacetophenone	7.00E-06	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
chlorobenzene	2.20E-05	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
chloroform	5.90E-05	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
cumene	5.30E-06	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
cyanide	2.50E-03	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
2,4-dinitrotoluene	2.80E-07	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
dimethyl sulfate	4.80E-05	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
ethyl benzene	9.40E-05	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
ethyl chloride	4.20E-05	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
ethylene dichloride	4.00E-05	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
ethylene dibromide	1.20E-06	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
hexane	6.70E-05	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
isophorone	5.80E-04	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
methyl bromide	1.60E-04	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
methyl chloride	5.30E-04	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
methyl ethyl ketone	3.90E-04	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
methyl hydrazine	1.70E-04	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
methyl methacrylate	2.00E-05	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions

methyl tert butyl ether		3.50E-05	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
methylene chloride		2.90E-04	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
naphthalene		1.30E-05	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
phenol		1.60E-05	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
propionaldehyde		3.80E-04	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
tetrachloroethylene		4.30E-05	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
toluene		2.40E-04	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
1,1,1-trichloroethane		2.00E-05	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
styrene		2.50E-05	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
xylenes		3.70E-05	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
vinyl acetate		7.60E-06	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
3. Emission Factors for Industrial Boilers - Small Wall-fired Natural Gas Combustion (10 to 100 MMBtu/hr)				
PM		7.6	lb/10^6 ft^3	Tables 9-24 AEI Guidance Document
NO_x		100	lb/10^6 ft^3	Tables 9-23 AEI Guidance Document
SO_x		0.6	lb/10^6 ft^3	Tables 9-24 AEI Guidance Document
CO		84	lb/10^6 ft^3	Tables 9-23 AEI Guidance Document
VOC		5.5	lb/10^6 ft^3	Tables 9-24 AEI Guidance Document
4. HAP emission factors for all natural gas combustion sources				
Arsenic		2.00E-04	lb/10^6 ft^3	Table 9-25 AEI Guidance Document
Beryllium		1.20E-05	lb/10^6 ft^3	Table 9-25 AEI Guidance Document
Cadmium		1.10E-03	lb/10^6 ft^3	Table 9-25 AEI Guidance Document
Chromium		1.40E-03	lb/10^6 ft^3	Table 9-25 AEI Guidance Document
Cobalt		8.40E-05	lb/10^6 ft^3	Table 9-25 AEI Guidance Document
Lead		5.00E-04	lb/10^6 ft^3	Table 9-25 AEI Guidance Document
Manganese		3.80E-04	lb/10^6 ft^3	Table 9-25 AEI Guidance Document
Mercury		2.60E-04	lb/10^6 ft^3	Table 9-25 AEI Guidance Document
Nickel		2.10E-03	lb/10^6 ft^3	Table 9-25 AEI Guidance Document
Selenium		2.40E-05	lb/10^6 ft^3	Table 9-25 AEI Guidance Document
Benzene		2.10E-03	lb/10^6 ft^3	Table 9-25 AEI Guidance Document
Formaldehyde		7.50E-02	lb/10^6 ft^3	Table 9-25 AEI Guidance Document
Hexane		1.80E+00	lb/10^6 ft^3	Table 9-25 AEI Guidance Document
Naphthalene		6.10E-04	lb/10^6 ft^3	Table 9-25 AEI Guidance Document
Polycyclic Organic Matter		8.80E-05	lb/10^6 ft^3	Table 9-25 AEI Guidance Document
Toluene		3.40E-03	lb/10^6 ft^3	Table 9-25 AEI Guidance Document
5. Bituminous coal heating value		26.00	MMBtu/ton	Table 9-2 AEI Guidance Document
6. Natural gas heating value		1,020.00	MMBtu/MMcuft	Table 9-2 AEI Guidance Document
7. Emission control data	No. 1/No. 3	85%	Dry lime scrubber	Controls particulate and acid gases
		99%	Baghouse	Controls particulate
	Overall PM control	99.85%		

Equation

Epol = F * UEF * [1-(CE/100)]

Epol = Emissions for a particular pollutant (lb/yr)
F = Fuel usage (tons/yr, MMcf/yr)
UEF = Uncontrolled emission factor for a particular pollutant (lb/ton, lb/10^6 ft^3)
CE = control device efficiency, %

Client:	Malmstrom AFB	**Date:**	10/27/2000
Location:	Base-wide	**Emissions:**	1999 Actual
Subject:	External Combustion - Coal-fired units	**Calc by:**	*DDM*

Coal Fired Boilers

Facility	Use	Max. Rated Capacity MMBtu/hr	Coal Usage tons	PM Emissions Pounds	PM_{10} Emissions Pounds	NO_x Emissions Pounds	SO_x Emissions Pounds	CO Emissions Pounds	VOC Emissions Pounds
CHP	Boiler No. 1	85	245.1	5.9	2.2	1838.3	9313.8	1470.6	12.3
CHP	Boiler No. 3	85	4769.1	114.5	42.9	35768.3	181225.8	28614.6	238.5

Facility	Use	Max. Rated Capacity MMBtu/hr	Coal Usage tons	Arsenic Emissions Pounds	Cadmium Emissions Pounds	Lead Emissions Pounds	Formaldehyde Emissions Pounds	HCl Emissions Pounds	HF Emissions Pounds	Acetaldehyde Emissions Pounds	Acetophenone Emissions Pounds	Acrolein Emissions Pounds	Benzene Emissions Pounds
CHP	Boiler No. 1	85	245.1	5.00E+00	4.00E-01	3.24E+00	5.88E-02	4.41E+01	5.51E+00	1.40E-01	3.68E-03	7.11E-02	3.19E-01
CHP	Boiler No. 3	85	4769.1	9.73E+01	7.77E+00	6.30E+01	1.14E+00	8.58E+02	1.07E+02	2.72E+00	7.15E-02	1.38E+00	6.20E+00

Facility	Use	Max. Rated Capacity MMBtu/hr	Coal Usage tons	Benzyl chloride Emissions Pounds	Biphenyl Emissions Pounds	Bis(2-ethylhexyl)phthalate (DEHP) Emissions Pounds	Bromoform Emissions Pounds	Carbon disulfide Emissions Pounds	2-chloroacetophenone Emissions Pounds	chlorobenzene Emissions Pounds	chloroform Emissions Pounds	cumene Emissions Pounds	cyanide Emissions Pounds
CHP	Boiler No. 1	85	245.1	1.72E-01	4.17E-04	1.79E-02	9.56E-03	3.19E-02	1.72E-03	5.39E-03	1.45E-02	1.30E-03	6.13E-01
CHP	Boiler No. 3	85	4769.1	3.34E+00	8.11E-03	3.48E-01	1.86E-01	6.20E-01	3.34E-02	1.05E-01	2.81E-01	2.53E-02	1.19E+01

Facility	Use	Max. Rated Capacity MMBtu/hr	Coal Usage tons	2,4-dinitrotoluene Emissions Pounds	dimethyl sulfate Emissions Pounds	ethyl benzene Emissions Pounds	ethyl chloride Emissions Pounds	ethylene dichloride Emissions Pounds	ethylene dibromide Emissions Pounds	hexane Emissions Pounds	isophorone Emissions Pounds	methyl bromide Emissions Pounds	methyl chloride Emissions Pounds
CHP	Boiler No. 1	85	245.1	6.86E-05	1.18E-02	2.30E-02	1.03E-02	9.80E-03	2.94E-04	1.64E-02	1.42E-01	3.92E-02	1.30E-01
CHP	Boiler No. 3	85	4769.1	1.34E-03	2.29E-01	4.48E-01	2.00E-01	1.91E-01	5.72E-03	3.20E-01	2.77E+00	7.63E-01	2.53E+00

Facility	Use	Max. Rated Capacity MMBtu/hr	Coal Usage tons	methyl ethyl ketone Emissions Pounds	methyl hydrazine Emissions Pounds	methyl methacrylate Emissions Pounds	methyl tert butyl ether Emissions Pounds	methylene chloride Emissions Pounds	naphthalene Emissions Pounds	phenol Emissions Pounds	propionaldehyde Emissions Pounds	tetrachloroethylene Emissions Pounds	toluene Emissions Pounds
CHP	Boiler No. 1	85	245.1	9.56E-02	4.17E-02	4.90E-03	8.58E-03	7.11E-02	3.19E-03	3.92E-03	9.31E-02	1.05E-02	5.88E-02
CHP	Boiler No. 3	85	4769.1	1.86E+00	8.11E-01	9.54E-02	1.67E-01	1.38E+00	6.20E-02	7.63E-02	1.81E+00	2.05E-01	1.14E+00

Facility	Use	Max. Rated Capacity MMBtu/hr	Coal Usage tons	1,1,1-trichloroethane Emissions Pounds	styrene Emissions Pounds	xylenes Emissions Pounds	vinyl acetate Emissions Pounds
CHP	Boiler No. 1	85	245.1	4.90E-03	6.13E-03	9.07E-03	1.86E-03
CHP	Boiler No. 3	85	4769.1	9.54E-02	1.19E-01	1.76E-01	3.62E-02

Client: Malmstrom AFB
Location: Base-wide
Subject: External Combustion - Natural Gas

Date: 10/27/2000
Emissions: 1999 Actual
Calc by: *DDM*

Parameter	Quantity	Units	Basis
1. Emission Factors for Residential Natural Gas Combustion (<0.3 MMBtu/hr)			
PM/PM_{10}	7.6	$lb/10^6 ft^3$	Tables 9-24 AEI Guidance Document
NO_x	94	$lb/10^6 ft^3$	Tables 9-23 AEI Guidance Document
SO_x	0.6	$lb/10^6 ft^3$	Tables 9-24 AEI Guidance Document
CO	40	$lb/10^6 ft^3$	Tables 9-23 AEI Guidance Document
VOC	5.5	$lb/10^6 ft^3$	Tables 9-24 AEI Guidance Document
2. Emission Factors for Small Industrial/Commercial - Wall-fired boilers Natural Gas Combustion (0.3 to <10 MMBtu/hr)			
PM/PM_{10}	7.6	$lb/10^6 ft^3$	Tables 9-24 AEI Guidance Document
NO_x	100	$lb/10^6 ft^3$	Tables 9-23 AEI Guidance Document
SO_x	0.6	$lb/10^6 ft^3$	Tables 9-24 AEI Guidance Document
CO	84	$lb/10^6 ft^3$	Tables 9-23 AEI Guidance Document
VOC	5.5	$lb/10^6 ft^3$	Tables 9-24 AEI Guidance Document
3. Emission Factors for Industrial Boilers - Small Wall-fired Natural Gas Combustion (10 to 100 MMBtu/hr)			
PM	7.6	$lb/10^6 ft^3$	Tables 9-24 AEI Guidance Document
NO_x	100	$lb/10^6 ft^3$	Tables 9-23 AEI Guidance Document
SO_x	0.6	$lb/10^6 ft^3$	Tables 9-24 AEI Guidance Document
CO	84	$lb/10^6 ft^3$	Tables 9-23 AEI Guidance Document
VOC	5.5	$lb/10^6 ft^3$	Tables 9-24 AEI Guidance Document
4. HAP emission factors for all natural gas combustion sources			
Arsenic	2.00E-04	$lb/10^6 ft^3$	Table 9-25 AEI Guidance Document
Beryllium	1.20E-05	$lb/10^6 ft^3$	Table 9-25 AEI Guidance Document
Cadmium	1.10E-03	$lb/10^6 ft^3$	Table 9-25 AEI Guidance Document
Chromium	1.40E-03	$lb/10^6 ft^3$	Table 9-25 AEI Guidance Document
Cobalt	8.40E-05	$lb/10^6 ft^3$	Table 9-25 AEI Guidance Document
Lead	5.00E-04	$lb/10^6 ft^3$	Table 9-25 AEI Guidance Document
Manganese	3.80E-04	$lb/10^6 ft^3$	Table 9-25 AEI Guidance Document
Mercury	2.60E-04	$lb/10^6 ft^3$	Table 9-25 AEI Guidance Document
Nickel	2.10E-03	$lb/10^6 ft^3$	Table 9-25 AEI Guidance Document
Selenium	2.40E-05	$lb/10^6 ft^3$	Table 9-25 AEI Guidance Document
Benzene	2.10E-03	$lb/10^6 ft^3$	Table 9-25 AEI Guidance Document
Formaldehyde	7.50E-02	$lb/10^6 ft^3$	Table 9-25 AEI Guidance Document
Hexane	1.80E+00	$lb/10^6 ft^3$	Table 9-25 AEI Guidance Document
Naphthalene	6.10E-04	$lb/10^6 ft^3$	Table 9-25 AEI Guidance Document
Polycyclic Organic Matter	8.80E-05	$lb/10^6 ft^3$	Table 9-25 AEI Guidance Document
Toluene	3.40E-03	$lb/10^6 ft^3$	Table 9-25 AEI Guidance Document
5. Facility-wide Natural Gas usage in 1999	315.74	MMcf	Facility Records
5a. Residential natural gas usage in 1999	115.36	MMcf	Facility Records
5b. Other base natural gas usage in 1999	200.38	MMcf	Facility Records
6. Natural gas heating value	1,020.00	MMBtu/MMcuft	Table 9-2 AEI Guidance Document

Equation

Epol = F * EF

Epol = Emissions for a particular pollutant (lb/yr)
F = Fuel usage (MMcf/yr)
EF = Emission factor for a particular pollutant ($lb/10^6 ft^3$)

Client: Malmstrom AFB
Location: Base-wide
Subject: External Combustion - Natural Gas

Date: 10/27/2000
Emissions: 1999 Actual
Calc by: *DDM*

Residential Natural Gas Fired Boilers (<0.3 MMBtu/hr)

Facility	Use	Max. Rated Capacity MMBtu/hr	Natural gas Usage 10^6 ft^3	PM Emissions Pounds	PM_{10} Emissions Pounds	NO_x Emissions Pounds	SO_x Emissions Pounds	CO Emissions Pounds	VOC Emissions Pounds
B330	Hot water boiler	0.174	0.49	3.73	3.73	46.18	0.29	19.65	2.70
B1020	Hot water boiler	0.255	0.72	5.47	5.47	67.68	0.43	28.80	3.96
B1320	Hot water boiler	0.23	0.65	4.94	4.94	61.04	0.39	25.98	3.57
B2041	Hot water boiler	0.134	1.15	8.75	8.75	108.18	0.69	46.03	6.33

Commercial/Institutional Natural Gas Fired Boilers (0.3 to <10 MMBtu/hr)

Facility	Use	Max. Rated Capacity MMBtu/hr	Natural gas Usage 10^6 ft^3	PM Emissions Pounds	PM_{10} Emissions Pounds	NO_x Emissions Pounds	SO_x Emissions Pounds	CO Emissions Pounds	VOC Emissions Pounds
B165	Steam boiler	2.643	7.46	56.72	56.72	746.26	4.48	626.86	41.04
B370	Hot water boiler	0.4	14.32	108.86	108.86	1432.31	8.59	1203.14	78.78
B448	Hot water boiler	0.394	2.50	19.02	19.02	250.31	1.50	210.26	13.77
B473	Hot water boiler	0.423	3.63	27.61	27.61	363.28	2.18	305.16	19.98
B737	Hot water boiler	1.874	11.91	90.48	90.48	1190.54	7.14	1000.05	65.48
B766	Steam boiler	5.976	16.87	128.24	128.24	1687.34	10.12	1417.37	92.80
B1010	Steam boiler	1.445	4.08	31.01	31.01	408.00	2.45	342.72	22.44
B1020	Steam boiler	2.386	6.74	51.20	51.20	673.69	4.04	565.90	37.05
B1222	Hot water boiler	0.429	2.73	20.71	20.71	272.54	1.64	228.93	14.99
B1240	Hot water boiler	1.5	12.88	97.91	97.91	1288.24	7.73	1082.12	70.85
B1840	Hot water boiler	3.634	23.09	175.46	175.46	2308.66	13.85	1939.27	126.98
B1840	Hot water boiler	1.549	9.84	74.79	74.79	984.07	5.90	826.62	54.12
B1845	Hot water boiler	0.49	3.11	23.66	23.66	311.29	1.87	261.49	17.12
B1867	Hot water boiler	0.349	2.22	16.85	16.85	221.72	1.33	186.24	12.19
B1879	Hot water boiler	0.571	3.63	27.57	27.57	362.75	2.18	304.71	19.95
B2040	Steam boiler	0.391	1.10	8.39	8.39	110.40	0.66	92.74	6.07
B3063	Steam boiler	5.714	36.30	275.89	275.89	3630.07	21.78	3049.26	199.65
B9001	Hot water boiler	4.781	30.37	230.84	230.84	3037.34	18.22	2551.37	167.05

Industrial Natural Gas Fired Boilers (10 to 100 MMBtu/hr)

Facility	Use	Max. Rated Capacity MMBtu/hr	Natural gas Usage 10^6 ft^3	PM Emissions Pounds	PM_{10} Emissions Pounds	NO_x Emissions Pounds	SO_x Emissions Pounds	CO Emissions Pounds	VOC Emissions Pounds
B1075	Steam boiler	11.954	33.75	256.52	256.52	3375.25	20.25	2835.21	185.64
CHP	Boiler No. 2 central heating	35	81.87	622.21	622.21	8186.96	49.12	6877.05	450.28

Natural gas combustion - all units (HAPs)

Facility	Use	Max. Rated Capacity MMBtu/hr	Natural gas Usage 10^6 ft^3	Arsenic Emissions Pounds	Beryllium Emissions Pounds	Cadmium Emissions Pounds	Chromium Emissions Pounds	Cobalt Emissions Pounds	Lead Emissions Pounds	Manganese Emissions Pounds	Mercury Emissions Pounds	Nickel Emissions Pounds	Selenium Emissions Pounds	Benzene Emissions Pounds
B330	Hot water boiler	0.174	0.49	9.83E-05	5.90E-06	5.40E-04	6.88E-04	4.13E-05	2.46E-04	1.87E-04	1.28E-04	1.03E-03	1.18E-05	1.03E-03
B1020	Hot water boiler	0.255	0.72	1.44E-04	8.64E-06	7.92E-04	1.01E-03	6.05E-05	3.60E-04	2.74E-04	1.87E-04	1.51E-03	1.73E-05	1.51E-03
B1320	Hot water boiler	0.23	0.65	1.30E-04	7.79E-06	7.14E-04	9.09E-04	5.46E-05	3.25E-04	2.47E-04	1.69E-04	1.36E-03	1.56E-05	1.36E-03
B2041	Hot water boiler	0.134	1.15	2.30E-04	1.38E-05	1.27E-03	1.61E-03	9.67E-05	5.75E-04	4.37E-04	2.99E-04	2.42E-03	2.76E-05	2.42E-03
B165	Steam boiler	2.643	7.46	1.49E-03	8.96E-05	8.21E-03	1.04E-02	6.27E-04	3.73E-03	2.84E-03	1.94E-03	1.57E-02	1.79E-04	1.57E-02
B370	Hot water boiler	0.4	14.32	2.86E-03	1.72E-04	1.58E-02	2.01E-02	1.20E-03	7.16E-03	5.44E-03	3.72E-03	3.01E-02	3.44E-04	3.01E-02
B448	Hot water boiler	0.394	2.50	5.01E-04	3.00E-05	2.75E-03	3.50E-03	2.10E-04	1.25E-03	9.51E-04	6.51E-04	5.26E-03	6.01E-05	5.26E-03
B473	Hot water boiler	0.423	3.63	7.27E-04	4.36E-05	4.00E-03	5.09E-03	3.05E-04	1.82E-03	1.38E-03	9.45E-04	7.63E-03	8.72E-05	7.63E-03
B737	Hot water boiler	1.874	11.91	2.38E-03	1.43E-04	1.31E-02	1.67E-02	1.00E-03	5.95E-03	4.52E-03	3.10E-03	2.50E-02	2.86E-04	2.50E-02
B766	Steam boiler	5.976	16.87	3.37E-03	2.02E-04	1.86E-02	2.36E-02	1.42E-03	8.44E-03	6.41E-03	4.39E-03	3.54E-02	4.05E-04	3.54E-02
B1010	Steam boiler	1.445	4.08	8.16E-04	4.90E-05	4.49E-03	5.71E-03	3.43E-04	2.04E-03	1.55E-03	1.06E-03	8.57E-03	9.79E-05	8.57E-03
B1020	Steam boiler	2.386	6.74	1.35E-03	8.08E-05	7.41E-03	9.43E-03	5.66E-04	3.37E-03	2.56E-03	1.75E-03	1.41E-02	1.62E-04	1.41E-02
B1222	Hot water boiler	0.429	2.73	5.45E-04	3.27E-05	3.00E-03	3.82E-03	2.29E-04	1.36E-03	1.04E-03	7.09E-04	5.72E-03	6.54E-05	5.72E-03
B1240	Hot water boiler	1.5	12.88	2.58E-03	1.55E-04	1.42E-02	1.80E-02	1.08E-03	6.44E-03	4.90E-03	3.35E-03	2.71E-02	3.09E-04	2.71E-02
B1840	Hot water boiler	3.634	23.09	4.62E-03	2.77E-04	2.54E-02	3.23E-02	1.94E-03	1.15E-02	8.77E-03	6.00E-03	4.85E-02	5.54E-04	4.85E-02

Client:	Malmstrom AFB
Location:	Base-wide
Subject:	External Combustion - Natural Gas

Date:	10/27/2000
Emissions:	1999 Actual
Calc by:	*DDM*

B1840	Hot water boiler	1.549	9.84	1.97E-03	1.18E-04	1.08E-02	1.38E-02	8.27E-04	4.92E-03	3.74E-03	2.56E-03	2.07E-02	2.36E-04	2.07E-02
B1845	Hot water boiler	0.49	3.11	6.23E-04	3.74E-05	3.42E-03	4.36E-03	2.61E-04	1.56E-03	1.18E-03	8.09E-04	6.54E-03	7.47E-05	6.54E-03
B1867	Hot water boiler	0.349	2.22	4.43E-04	2.66E-05	2.44E-03	3.10E-03	1.86E-04	1.11E-03	8.43E-04	5.76E-04	4.66E-03	5.32E-05	4.66E-03
B1879	Hot water boiler	0.571	3.63	7.26E-04	4.35E-05	3.99E-03	5.08E-03	3.05E-04	1.81E-03	1.38E-03	9.43E-04	7.62E-03	8.71E-05	7.62E-03
B2040	Steam boiler	0.391	1.10	2.21E-04	1.32E-05	1.21E-03	1.55E-03	9.27E-05	5.52E-04	4.20E-04	2.87E-04	2.32E-03	2.65E-05	2.32E-03
B3063	Steam boiler	5.714	36.30	7.26E-03	4.36E-04	3.99E-02	5.08E-02	3.05E-03	1.82E-02	1.38E-02	9.44E-03	7.62E-02	8.71E-04	7.62E-02
B9001	Hot water boiler	4.781	30.37	6.07E-03	3.64E-04	3.34E-02	4.25E-02	2.55E-03	1.52E-02	1.15E-02	7.90E-03	6.38E-02	7.29E-04	6.38E-02
B1075	Steam boiler	11.954	33.75	6.75E-03	4.05E-04	3.71E-02	4.73E-02	2.84E-03	1.69E-02	1.28E-02	8.78E-03	7.09E-02	8.10E-04	7.09E-02
CHP	Boiler No. 2 central heating	35	81.87	1.64E-02	9.82E-04	9.01E-02	1.15E-01	6.88E-03	4.09E-02	3.11E-02	2.13E-02	1.72E-01	1.96E-03	1.72E-01

Natural gas combustion - all units (HAPs)

Facility	Use	Max. Rated Capacity MMBtu/hr	Natural gas Usage 10^6 ft^3	Formaldehyde Emissions Pounds	Hexane Emissions Pounds	Naphthalene Emissions Pounds	POM Emissions Pounds	Toluene Emissions Pounds
B330	Hot water boiler	0.174	0.49	3.68E-02	8.84E-01	3.00E-04	4.32E-05	1.67E-03
B1020	Hot water boiler	0.255	0.72	5.40E-02	1.30E+00	4.39E-04	6.34E-05	2.45E-03
B1320	Hot water boiler	0.23	0.65	4.87E-02	1.17E+00	3.96E-04	5.71E-05	2.21E-03
B2041	Hot water boiler	0.134	1.15	8.63E-02	2.07E+00	7.02E-04	1.01E-04	3.91E-03
B165	Steam boiler	2.643	7.46	5.60E-01	1.34E+01	4.55E-03	6.57E-04	2.54E-02
B370	Hot water boiler	0.4	14.32	1.07E+00	2.58E+01	8.74E-03	1.26E-03	4.87E-02
B448	Hot water boiler	0.394	2.50	1.88E-01	4.51E+00	1.53E-03	2.20E-04	8.51E-03
B473	Hot water boiler	0.423	3.63	2.72E-01	6.54E+00	2.22E-03	3.20E-04	1.24E-02
B737	Hot water boiler	1.874	11.91	8.93E-01	2.14E+01	7.26E-03	1.05E-03	4.05E-02
B766	Steam boiler	5.976	16.87	1.27E+00	3.04E+01	1.03E-02	1.48E-03	5.74E-02
B1010	Steam boiler	1.445	4.08	3.06E-01	7.34E+00	2.49E-03	3.59E-04	1.39E-02
B1020	Steam boiler	2.386	6.74	5.05E-01	1.21E+01	4.11E-03	5.93E-04	2.29E-02
B1222	Hot water boiler	0.429	2.73	2.04E-01	4.91E+00	1.66E-03	2.40E-04	9.27E-03
B1240	Hot water boiler	1.5	12.88	9.66E-01	2.32E+01	7.86E-03	1.13E-03	4.38E-02
B1840	Hot water boiler	3.634	23.09	1.73E+00	4.16E+01	1.41E-02	2.03E-03	7.85E-02
B1840	Hot water boiler	1.549	9.84	7.38E-01	1.77E+01	6.00E-03	8.66E-04	3.35E-02
B1845	Hot water boiler	0.49	3.11	2.33E-01	5.60E+00	1.90E-03	2.74E-04	1.06E-02
B1867	Hot water boiler	0.349	2.22	1.66E-01	3.99E+00	1.35E-03	1.95E-04	7.54E-03
B1879	Hot water boiler	0.571	3.63	2.72E-01	6.53E+00	2.21E-03	3.19E-04	1.23E-02
B2040	Steam boiler	0.391	1.10	8.28E-02	1.99E+00	6.73E-04	9.72E-05	3.75E-03
B3063	Steam boiler	5.714	36.30	2.72E+00	6.53E+01	2.21E-02	3.19E-03	1.23E-01
B9001	Hot water boiler	4.781	30.37	2.28E+00	5.47E+01	1.85E-02	2.67E-03	1.03E-01
B1075	Steam boiler	11.954	33.75	2.53E+00	6.08E+01	2.06E-02	2.97E-03	1.15E-01
CHP	Boiler No. 2 central heating	35	81.87	6.14E+00	1.47E+02	4.99E-02	7.20E-03	2.78E-01

Actual Emissions Summary

	PM	PM_{10}	NO_x	SO_x	CO	VOC
Natural Gas Emissions (lb/yr)	2,367	2,367	31,124	187	26,027	1,713
Total Emissions (tons/yr)	1.18	1.18	15.56	0.09	13.01	0.86

	Arsenic	Beryllium	Cadmium	Chromium	Cobalt	Lead	Manganese	Mercury	Nickel	Selenium	Benzene
Natural Gas Emissions (lb/yr)	0.06	0.004	0.34	0.44	0.03	0.16	0.12	0.08	0.65	0.01	0.65
Total Emissions (tons/yr)	0.000031	0.000002	0.000171	0.000218	0.000013	0.000078	0.000059	0.000040	0.000327	0.000004	0.000327

	Formaldehyde	Hexane	Naphthalene	POM	Toluene
Natural Gas Emissions (lb/yr)	23.36	561	0.19	0.03	1.06
Total Emissions (tons/yr)	0.012	0.280	0.000095	0.000014	0.00053

Total HAPs
587.7
0.29

Client: Malmstrom AFB
Location:
Subject: External Combustion - Waste Oil Burner

Date: 10/27/2000
Emissions: 1999 Actual
Calc by: *DDM*

Parameter		Quantity	Units	Basis	
1. Emission Factors for Small Boilers					
Waste Oil Combustion					
PM	64A	5.12	$lb/10^3$ gal	Table 9-27 AEI Guidance Document	Assume ash content = 0.08% (residual oil - AP-40)
NO_x		19	$lb/10^3$ gal	Table 9-27 AEI Guidance Document	
SO_x (0.5% sulfur)	147s	411.6	$lb/10^3$ gal	Table 9-27 AEI Guidance Document	Assume sulfur content = 2.8 % wt
CO		5	$lb/10^3$ gal	Table 9-27 AEI Guidance Document	
VOC		1.0	$lb/10^3$ gal	Table 9-27 AEI Guidance Document	
where A = % ash and S = % sulfur		assumed			
2. HAP emission factors for waste oil combustion sources					
Antimony		BDL	$lb/10^3$ gal	Table 9-28 AEI Guidance Document	
Arsenic		1.10E-01	$lb/10^3$ gal	Table 9-28 AEI Guidance Document	
Beryllium		BDL	$lb/10^3$ gal	Table 9-28 AEI Guidance Document	
Cadmium		9.30E-03	$lb/10^3$ gal	Table 9-28 AEI Guidance Document	
Chromium		2.00E-02	$lb/10^3$ gal	Table 9-28 AEI Guidance Document	
Cobalt		2.10E-04	$lb/10^3$ gal	Table 9-28 AEI Guidance Document	
HCl	Assumed Cl negligible - no data available	66Cl	$lb/10^3$ gal	Table 9-28 AEI Guidance Document	Cl = wt% chlorine in fuel
Lead	Assumed lead negligible - no data avail.	55L	$lb/10^3$ gal	Table 9-28 AEI Guidance Document	L = wt% lead in fuel
Manganese		6.80E-02	$lb/10^3$ gal	Table 9-28 AEI Guidance Document	
Nickel		1.10E-02	$lb/10^3$ gal	Table 9-28 AEI Guidance Document	
Selenium		BDL	$lb/10^3$ gal	Table 9-28 AEI Guidance Document	
Phosphorous		ND	$lb/10^3$ gal	Table 9-28 AEI Guidance Document	
Bis (2-ethylhexyl)phthalate		ND	$lb/10^3$ gal	Table 9-28 AEI Guidance Document	
Dibutylphthalate		ND	$lb/10^3$ gal	Table 9-28 AEI Guidance Document	
Dichlorobenzene		ND	$lb/10^3$ gal	Table 9-28 AEI Guidance Document	
Naphthalene		ND	$lb/10^3$ gal	Table 9-28 AEI Guidance Document	
Phenol		ND	$lb/10^3$ gal	Table 9-28 AEI Guidance Document	
Polycyclic Organic Matter		ND	$lb/10^3$ gal	Table 9-28 AEI Guidance Document	
3. Waste oil usage in 1999		888.00	gallons	Facility Records	
4. Waste oil heating value		140.00	$MMBtu/10^3$ gal	Table 9-2 AEI Guidance Document for distillate fuel oil	

Client:	Malmstrom AFB	**Date:**	10/27/2000
Location:		**Emissions:**	1999 Actual
Subject:	External Combustion - Waste Oil Burner	**Calc by:**	*DDM*

Equation

Epol = F * EF

Epol = Emissions for a particular pollutant (lb/yr)
F = Fuel usage (MMcf/yr)
EF = Emission factor for a particular pollutant (lb/10^6 ft^3)

Waste Oil Fired Boilers

Facility	Use	Max. Rated Capacity MMBtu/hr	Waste oil Usage 1000 gal	PM Emissions Pounds	PM_{10} Emissions Pounds	NO_x Emissions Pounds	SO_x Emissions Pounds	CO Emissions Pounds	VOC Emissions Pounds
B870	Waste oil burner	0.225	0.888	4.55	4.55	16.87	365.50	4.44	0.89

Facility	Use	Max. Rated Capacity MMBtu/hr	Waste oil Usage 1000 gal	Arsenic Emissions Pounds	Cadmium Emissions Pounds	Chromium Emissions Pounds	Cobalt Emissions Pounds	HCl Emissions Pounds	Lead Emissions Pounds	Manganese Emissions Pounds	Nickel Emissions Pounds
B870	Waste oil burner	0.225	0.888	9.77E-02	8.26E-03	1.78E-02	1.86E-04	0	0	6.04E-02	9.77E-03

Actual Emissions Summary

	PM	PM_{10}	NO_x	SO_x	CO	VOC
Emissions (lb/yr)	4.5	4.5	16.9	365.5	4.4	0.9
Total Emissions (tons/yr)	0.002	0.002	0.01	0.18	0.0022	0.0004

	Arsenic	Cadmium	Chromium	Cobalt	HCl	Lead	Manganese	Nickel	Total HAPs
Emissions (lb/yr)	0.10	0.01	0.02	0.0002	0	0	0.06	0.01	0.2
Total Emissions (tons/yr)	0.000049	0.000004	0.000009	0.0000001	0	0	0.00003	0.000005	0.0001

Client: Malmstrom AFB
Location: Base-wide
Subject: External Combustion - CHP

Date: 10/27/2000
Emissions: Potential
Calc by: *DDM*

Parameter		Quantity	Units	Basis
1. Emission Limits for Coal-firing				
	PM	4	lb/hr	Permit No. 1427-02
	PM_{10}	4	lb/hr	Permit No. 1427-02
	NO_x	0.5	lb/MMBtu	Permit No. 1427-02
	SO_x	0.32	lb/MMBtu	Permit No. 1427-02
	CO	5	lb/ton coal	FIRE V 5.0
	VOC	0.05	lb/ton coal	FIRE V 5.0
2. Emission Limits for Gas-firing				
	PM	4	lb/hr	Permit No. 1427-02
	NO_x	0.5	lb/MMBtu	Permit No. 1427-02
	SO_x	0.6	lb/MMscf	FIRE V 5.0
	CO	35	lb/MMscf	FIRE V 5.0
	VOC	2.8	lb/MMscf	FIRE V 5.0
3. HAP emission factors for bituminous and subbituminous coal combustion				
	Arsenic	2.04E-02	lb/ton	Table 9-7 AEI Guidance Document
	Beryllium	ND	lb/ton	Table 9-7 AEI Guidance Document
	Cadmium	1.63E-03	lb/ton	Table 9-7 AEI Guidance Document
	Chromium	ND	lb/ton	Table 9-7 AEI Guidance Document
	Lead	1.32E-02	lb/ton	Table 9-7 AEI Guidance Document
	Manganese	ND	lb/ton	Table 9-7 AEI Guidance Document
	Mercury	ND	lb/ton	Table 9-7 AEI Guidance Document
	Nickel	ND	lb/ton	Table 9-7 AEI Guidance Document
	Polycyclic Organic Matter	ND	lb/ton	Table 9-7 AEI Guidance Document
	Formaldehyde	2.40E-04	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
	HCl	1.20E+00	lb/ton	Table 9-11 AEI Guidance Document
	HF	1.50E-01	lb/ton	Table 9-11 AEI Guidance Document
	Acetaldehyde	5.70E-04	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
	Acetophenone	1.50E-05	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
	Acrolein	2.90E-04	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
	Benzene	1.30E-03	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
	Benzyl chloride	7.00E-04	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
	Biphenyl	1.70E-06	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
	Bis(2-ethylhexyl)phthalate (DEHP)	7.30E-05	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
	Bromoform	3.90E-05	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
	Carbon disulfide	1.30E-04	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
	2-chloroacetophenone	7.00E-06	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
	chlorobenzene	2.20E-05	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
	chloroform	5.90E-05	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
	cumene	5.30E-06	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
	cyanide	2.50E-03	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
	2,4-dinitrotoluene	2.80E-07	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
	dimethyl sulfate	4.80E-05	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
	ethyl benzene	9.40E-05	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
	ethyl chloride	4.20E-05	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
	ethylene dichloride	4.00E-05	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
	ethylene dibromide	1.20E-06	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
	hexane	6.70E-05	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
	isophorone	5.80E-04	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
	methyl bromide	1.60E-04	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
	methyl chloride	5.30E-04	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions

methyl ethyl ketone	3.90E-04	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
methyl hydrazine	1.70E-04	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
methyl methacrylate	2.00E-05	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
methyl tert butyl ether	3.50E-05	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
methylene chloride	2.90E-04	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
naphthalene	1.30E-05	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
phenol	1.60E-05	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
propionaldehyde	3.80E-04	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
tetrachloroethylene	4.30E-05	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
toluene	2.40E-04	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
1,1,1-trichloroethane	2.00E-05	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
styrene	2.50E-05	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
xylenes	3.70E-05	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
vinyl acetate	7.60E-06	lb/ton	Table 9-8 AEI Guidance Document, controlled emissions
4. HAP emission factors for all natural gas combustion sources			
Arsenic	2.00E-04	$lb/10^6 ft^3$	Table 9-25 AEI Guidance Document
Beryllium	1.20E-05	$lb/10^6 ft^3$	Table 9-25 AEI Guidance Document
Cadmium	1.10E-03	$lb/10^6 ft^3$	Table 9-25 AEI Guidance Document
Chromium	1.40E-03	$lb/10^6 ft^3$	Table 9-25 AEI Guidance Document
Cobalt	8.40E-05	$lb/10^6 ft^3$	Table 9-25 AEI Guidance Document
Lead	5.00E-04	$lb/10^6 ft^3$	Table 9-25 AEI Guidance Document
Manganese	3.80E-04	$lb/10^6 ft^3$	Table 9-25 AEI Guidance Document
Mercury	2.60E-04	$lb/10^6 ft^3$	Table 9-25 AEI Guidance Document
Nickel	2.10E-03	$lb/10^6 ft^3$	Table 9-25 AEI Guidance Document
Selenium	2.40E-05	$lb/10^6 ft^3$	Table 9-25 AEI Guidance Document
Benzene	2.10E-03	$lb/10^6 ft^3$	Table 9-25 AEI Guidance Document
Formaldehyde	7.50E-02	$lb/10^6 ft^3$	Table 9-25 AEI Guidance Document
Hexane	1.80E+00	$lb/10^6 ft^3$	Table 9-25 AEI Guidance Document
Naphthalene	6.10E-04	$lb/10^6 ft^3$	Table 9-25 AEI Guidance Document
Polycyclic Organic Matter	8.80E-05	$lb/10^6 ft^3$	Table 9-25 AEI Guidance Document
Toluene	3.40E-03	$lb/10^6 ft^3$	Table 9-25 AEI Guidance Document
5. Bituminous coal heating value	26.00	MMBtu/ton	Table 9-2 AEI Guidance Document and historical coal analysis provided by Malmstrom AFB
6. Natural gas heating value	1,020.00	MMBtu/MMcuft	Table 9-2 AEI Guidance Document

7. Potential Emissions based on permit limits and resulting maximum fuel usage
   - Max. fuel consumption = 999,000 MMBtu/yr (limit)
   - Using natural gas equates to 980 MMscf/yr
   - Using coal equates to 38,423 tons coal/yr

8. Boiler descriptions
   - Boiler No. 1 is a gas/coal -fired 85 MMBtu/hr unit
   - Boiler No. 2 is a gas -fired 35 MMBtu/hr unit
   - Boiler No. 3 is a coal -fired 85 MMBtu/hr unit
   - Dry lime scrubbers and baghouse are used when burning coal.

Client:	Malmstrom AFB	**Date:**	10/27/2000
Location:	Base-wide	**Emissions:**	Potential
Subject:	External Combustion - CHP	**Calc by:**	*DDM*

Unit	Fuel used	PM Emissions tons	PM_{10} Emissions tons	NO_x Emissions tons	SO_x Emissions tons	CO Emissions tons	VOC Emissions tons
All (Boilers 1, 2, 3)	coal or gas (highest permitted emissions)	52.6	52.6	249.8	159.8	96.1	1.37

Unit	Fuel used	Coal Usage tons	Arsenic Emissions Pounds	Cadmium Emissions Pounds	Lead Emissions Pounds	Formaldehyde Emissions Pounds	HCl Emissions Pounds	HF Emissions Pounds	Acetaldehyde Emissions Pounds	Acetophenone Emissions Pounds	Acrolein Emissions Pounds	Benzene Emissions Pounds	Benzyl chloride Emissions Pounds
All (Boilers 1, 2, 3)	coal	38423.0	783.8	62.6	507.2	9.2	11,988.0	1,498.5	21.9	0.6	11.1	49.9	26.9

Unit	Fuel used	Coal Usage tons	Biphenyl Emissions Pounds	Bis(2-ethylhexyl)phthalate (DEHP) Emissions Pounds	Bromoform Emissions Pounds	Carbon disulfide Emissions Pounds	2-chloroacetophenone Emissions Pounds	chlorobenzene Emissions Pounds	chloroform Emissions Pounds	cumene Emissions Pounds	cyanide Emissions Pounds	2,4-dinitrotoluene Emissions Pounds	dimethyl sulfate Emissions Pounds
All (Boilers 1, 2, 3)	coal	38423.0	0.1	2.8	1.5	5.0	0.3	0.8	2.3	0.2	96.1	0.011	1.8

Unit	Fuel used	Coal Usage tons	ethyl benzene Emissions Pounds	ethylene dichloride Emissions Pounds	ethylene dibromide Emissions Pounds	hexane Emissions Pounds	isophorone Emissions Pounds	methyl bromide Emissions Pounds	methyl chloride Emissions Pounds	methyl ethyl ketone Emissions Pounds	methyl hydrazine Emissions Pounds	methyl methacrylate Emissions Pounds	methyl tert butyl ether Emissions Pounds
All (Boilers 1, 2, 3)	coal	38423.0	1.6	1.5	0.05	2.6	22.3	6.1	20.4	15.0	6.5	0.768	1.3

Unit	Fuel used	Coal Usage tons	methylene chloride Emissions Pounds	naphthalene Emissions Pounds	phenol Emissions Pounds	propionaldehyde Emissions Pounds	tetrachloroethylene Emissions Pounds	toluene Emissions Pounds	1,1,1-trichloroethane Emissions Pounds	styrene Emissions Pounds	xylenes Emissions Pounds	vinyl acetate Emissions Pounds
All (Boilers 1, 2, 3)	coal	38423.0	11.1	0.5	0.61	14.6	1.7	9.2	0.8	1.0	1.4	0.292

Unit	Fuel used	Natural gas Usage 10^6 ft^3	Arsenic Emissions Pounds	Beryllium Emissions Pounds	Cadmium Emissions Pounds	Chromium Emissions Pounds	Cobalt Emissions Pounds	Lead Emissions Pounds	Manganese Emissions Pounds	Mercury Emissions Pounds	Nickel Emissions Pounds	Selenium Emissions Pounds	Benzene Emissions Pounds
All (Boilers 1, 2, 3)	gas	980.00	1.98E-01	1.18E-02	1.1	1.4	8.23E-02	4.90E-01	3.72E-01	2.55E-01	2.1	2.35E-02	2.1

Unit	Max. Rated Capacity MMBtu/hr	Natural gas Usage 10^6 ft^3	Formaldehyde Emissions Pounds	Hexane Emissions Pounds	Naphthalene Emissions Pounds	POM Emissions Pounds	Toluene Emissions Pounds
All (Boilers 1, 2, 3)	gas	980.00	73.5	1,764.0	5.98E-01	8.62E-02	3.3

Potential Emissions Summary*

	PM	PM_{10}	NO_x	SO_x	CO	VOC
Criteria Poll Emissions (ton/yr)	52.56	52.56	249.75	159.84	96.06	1.37
Total Emissions (tons/yr)	52.56	52.56	249.75	159.84	96.06	1.37

	Arsenic	Beryllium	Cadmium	Chromium	Cobalt	Lead	Manganese	Mercury	Nickel	Selenium	Benzene
Natural Gas Emissions (lb/yr)	0.20	0.0118	1.08	1.37	0.08	0.49	0.37	0.25	2.06	0.02	2.06
or Coal Emissions (lb/yr)	783.83	0	62.63	0	0	507.18	0	0	0	0	49.9
Highest Emissions (tons/yr)	0.39	0.00001	0.03	0.00069	0.00004	0.25	0.0002	0.0001	0.0010	0.00001	0.0250

	Formaldehyde	Hexane	Naphthalene	POM	Toluene	HCl	HF	Acetaldehyde	Acetophenone	Acrolein
Natural Gas Emissions (lb/yr)	73.50	1764.00	0.60	0.09	3.33	0	0	0	0	0
Coal Emissions (lb/yr)	9.22	2.6	0.50	0	9.2	11988	1498	21.9	0.6	11.1
Highest Emissions (tons/yr)	0.04	0.88	0.0003	0.00004	0.0046	6.0	0.75	0.01	0.0003	0.01

Client:	Malmstrom AFB		**Date:**	10/27/2000
Location:	Base-wide		**Emissions:**	Potential
Subject:	External Combustion - CHP		**Calc by:**	*DDM*

	Benzyl chloride	Biphenyl	Bis(2-ethylhexyl)phthalate (DEHP)	Bromoform	Carbon disulfide	2-chloroacetophenone	chlorobenzene	chloroform	cumene	cyanide	2,4-dinitrotoluene
Natural Gas Emissions (lb/yr)	52.56	0	0	0	0	0	0	0	0	0	0
or Coal Emissions (lb/yr)	26.90	0.065	2.80	1.50	4.99	0.27	0.85	2.27	0.20	96.06	0.01
Highest Emissions (tons/yr)	0.03	0.00003	0.001	0.0007	0.0025	0.0001	0.0004	0.0011	0.0001	0.0480	0.00001

	dimethyl sulfate	ethyl benzene	ethylene dichloride	ethylene dibromide	isophorone	methyl bromide	methyl chloride	methyl ethyl ketone	methyl hydrazine	methyl methacrylate	methyl tert butyl ether
Natural Gas Emissions (lb/yr)	0	0	0	0	0	0	0	0	0	0	0
Coal Emissions (lb/yr)	1.84	1.61	1.54	0.05	22.29	6.15	20.36	14.98	6.53	0.77	1.34
Highest Emissions (tons/yr)	0.0009	0.0008	0.0008	0.0000	0.0111	0.0031	0.0102	0.0075	0.0033	0.0004	0.0007

	methylene chloride	phenol	propionaldehyde	tetrachloroethylene	1,1,1-trichloroethane	styrene	xylenes	vinyl acetate
Natural Gas Emissions (lb/yr)	0	0	0	0	0	0	0	0
Coal Emissions (lb/yr)	11.14	0.50	0.61	14.60	1.65	9.22	0.77	0.96
Highest Emissions (tons/yr)	0.0056	0.0002	0.0003	0.0073	0.0008	0.0046	0.0004	0.0005

Total HAPs, tpy
8.53

* For HAP emissions, the greater of emissions from burning coal versus natural gas was selected to represent potential. Also a 74% control efficiency was applied to HCl and HF emissions since the dry lime scrubber controls these pollutants and is required by permit to operate. 74% is based on SO2 control measured during a recent source test. It is likely that control of HCl and HF would be higher however, there is no additional data to support use of a higher efficiency for these pollutants therefore 74 % was used.

Client:	Malmstrom AFB	**Date:**	10/27/2000
Location:	Base-wide	**Emissions:**	Potential
Subject:	External Combustion - Natural Gas (excluding CHP boilers)	**Calc by:**	*DDM*

Parameter	**Quantity**	**Units**	**Basis**
1. Emission Factors for Residential Natural Gas Combustion (<0.3 MMBtu/hr)			
PM/PM_{10}	7.6	$lb/10^6\ ft^3$	Tables 9-24 AEI Guidance Document
NO_x	94	$lb/10^6\ ft^3$	Tables 9-23 AEI Guidance Document
SO_x	0.6	$lb/10^6\ ft^3$	Tables 9-24 AEI Guidance Document
CO	40	$lb/10^6\ ft^3$	Tables 9-23 AEI Guidance Document
VOC	5.5	$lb/10^6\ ft^3$	Tables 9-24 AEI Guidance Document
2. Emission Factors for Small Industrial/Commercial - Wall-fired boilers Natural Gas Combustion (0.3 to <10 MMBtu/hr)			
PM/PM_{10}	7.6	$lb/10^6\ ft^3$	Tables 9-24 AEI Guidance Document
NO_x	100	$lb/10^6\ ft^3$	Tables 9-23 AEI Guidance Document
SO_x	0.6	$lb/10^6\ ft^3$	Tables 9-24 AEI Guidance Document
CO	84	$lb/10^6\ ft^3$	Tables 9-23 AEI Guidance Document
VOC	5.5	$lb/10^6\ ft^3$	Tables 9-24 AEI Guidance Document
3. Emission Factors for Industrial Boilers - Small Wall-fired Natural Gas Combustion (10 to 100 MMBtu/hr)			
PM	7.6	$lb/10^6\ ft^3$	Tables 9-24 AEI Guidance Document
NO_x	100	$lb/10^6\ ft^3$	Tables 9-23 AEI Guidance Document
SO_x	0.6	$lb/10^6\ ft^3$	Tables 9-24 AEI Guidance Document
CO	84	$lb/10^6\ ft^3$	Tables 9-23 AEI Guidance Document
VOC	5.5	$lb/10^6\ ft^3$	Tables 9-24 AEI Guidance Document
4. HAP emission factors for all natural gas combustion sources			
Arsenic	2.00E-04	$lb/10^6\ ft^3$	Table 9-25 AEI Guidance Document
Beryllium	1.20E-05	$lb/10^6\ ft^3$	Table 9-25 AEI Guidance Document
Cadmium	1.10E-03	$lb/10^6\ ft^3$	Table 9-25 AEI Guidance Document
Chromium	1.40E-03	$lb/10^6\ ft^3$	Table 9-25 AEI Guidance Document
Cobalt	8.40E-05	$lb/10^6\ ft^3$	Table 9-25 AEI Guidance Document
Lead	5.00E-04	$lb/10^6\ ft^3$	Table 9-25 AEI Guidance Document
Manganese	3.80E-04	$lb/10^6\ ft^3$	Table 9-25 AEI Guidance Document
Mercury	2.60E-04	$lb/10^6\ ft^3$	Table 9-25 AEI Guidance Document
Nickel	2.10E-03	$lb/10^6\ ft^3$	Table 9-25 AEI Guidance Document
Selenium	2.40E-05	$lb/10^6\ ft^3$	Table 9-25 AEI Guidance Document
Benzene	2.10E-03	$lb/10^6\ ft^3$	Table 9-25 AEI Guidance Document
Formaldehyde	7.50E-02	$lb/10^6\ ft^3$	Table 9-25 AEI Guidance Document
Hexane	1.80E+00	$lb/10^6\ ft^3$	Table 9-25 AEI Guidance Document
Naphthalene	6.10E-04	$lb/10^6\ ft^3$	Table 9-25 AEI Guidance Document
Polycyclic Organic Matter	8.80E-05	$lb/10^6\ ft^3$	Table 9-25 AEI Guidance Document
Toluene	3.40E-03	$lb/10^6\ ft^3$	Table 9-25 AEI Guidance Document
5. Natural gas heating value	1,020.00	MMBtu/MMcuft	Table 9-2 AEI Guidance Document

6. Potential Emissions based on 90% maximum capacity and 85% operation and uncontrolled.

Client:	Malmstrom AFB	**Date:**	10/27/2000
Location:	Base-wide	**Emissions:**	Potential
Subject:	External Combustion - Natural Gas (excluding CHP boilers)	**Calc by:**	*DDM*

Equation

Epol = F * EF

Epol = Emissions for a particular pollutant (lb/yr)
F = Fuel usage (MMcf/yr)
EF = Emission factor for a particular pollutant (lb/10^6 ft^3)

Residential Natural Gas Fired Boilers (<0.3 MMBtu/hr)

Facility	Use	Max. Rated Capacity MMBtu/hr	Natural gas Usage 10^6 ft^3	PM Emissions Pounds	PM_{10} Emissions Pounds	NO_x Emissions Pounds	SO_x Emissions Pounds	CO Emissions Pounds	VOC Emissions Pounds
B330	Hot water boiler	0.174	1.14	8.69	8.69	107.46	0.69	45.73	6.29
B1020	Hot water boiler	0.255	1.68	12.73	12.73	157.48	1.01	67.01	9.21
B1320	Hot water boiler	0.23	1.51	11.48	11.48	142.04	0.91	60.44	8.31
B2041	Hot water boiler	0.134	0.88	6.69	6.69	82.76	0.53	35.22	4.84

Commercial/Institutional Natural Gas Fired Boilers (0.3 to <10 MMBtu/hr)

Facility	Use	Max. Rated Capacity MMBtu/hr	Natural gas Usage 10^6 ft^3	PM Emissions Pounds	PM_{10} Emissions Pounds	NO_x Emissions Pounds	SO_x Emissions Pounds	CO Emissions Pounds	VOC Emissions Pounds
B165	Steam boiler	2.643	17.36	131.97	131.97	1736.45	10.42	1458.62	95.50
B370	Hot water boiler	0.4	2.63	19.97	19.97	262.80	1.58	220.75	14.45
B448	Hot water boiler	0.394	2.59	19.67	19.67	258.86	1.55	217.44	14.24
B473	Hot water boiler	0.423	2.78	21.12	21.12	277.91	1.67	233.45	15.29
B737	Hot water boiler	1.874	12.31	93.57	93.57	1231.22	7.39	1034.22	67.72
B766	Steam boiler	5.976	39.26	298.39	298.39	3926.23	23.56	3298.03	215.94
B1010	Steam boiler	1.445	9.49	72.15	72.15	949.37	5.70	797.47	52.22
B1020	Steam boiler	2.386	15.68	119.14	119.14	1567.60	9.41	1316.79	86.22
B1222	Hot water boiler	0.429	2.82	21.42	21.42	281.85	1.69	236.76	15.50
B1240	Hot water boiler	1.5	9.86	74.90	74.90	985.50	5.91	827.82	54.20
B1840	Hot water boiler	3.634	23.88	181.45	181.45	2387.54	14.33	2005.53	131.31
B1840	Hot water boiler	1.549	10.18	77.34	77.34	1017.69	6.11	854.86	55.97
B1845	Hot water boiler	0.49	3.22	24.47	24.47	321.93	1.93	270.42	17.71
B1867	Hot water boiler	0.349	2.29	17.43	17.43	229.29	1.38	192.61	12.61
B1879	Hot water boiler	0.571	3.75	28.51	28.51	375.15	2.25	315.12	20.63
B2040	Steam boiler	0.391	2.57	19.52	19.52	256.89	1.54	215.79	14.13
B3063	Steam boiler	5.714	37.54	285.31	285.31	3754.10	22.52	3153.44	206.48
B9001	Hot water boiler	4.781	31.41	238.72	238.72	3141.12	18.85	2638.54	172.76

Industrial Natural Gas Fired Boilers (10 to 100 MMBtu/hr)

Facility	Use	Max. Rated Capacity MMBtu/hr	Natural gas Usage 10^6 ft^3	PM Emissions Pounds	PM_{10} Emissions Pounds	NO_x Emissions Pounds	SO_x Emissions Pounds	CO Emissions Pounds	VOC Emissions Pounds
B1075	Steam boiler	11.954	78.54	596.89	596.89	7853.78	47.12	6597.17	431.96

Natural gas combustion - all units (HAPs)

Facility	Use	Max. Rated Capacity MMBtu/hr	Natural gas Usage 10^6 ft^3	Arsenic Emissions Pounds	Beryllium Emissions Pounds	Cadmium Emissions Pounds	Chromium Emissions Pounds	Cobalt Emissions Pounds	Lead Emissions Pounds	Manganese Emissions Pounds	Mercury Emissions Pounds	Nickel Emissions Pounds	Selenium Emissions Pounds	Benzene Emissions Pounds
B330	Hot water boiler	0.174	1.14	2.29E-04	1.37E-05	1.26E-03	1.60E-03	9.60E-05	5.72E-04	4.34E-04	2.97E-04	2.40E-03	2.74E-05	2.40E-03
B1020	Hot water boiler	0.255	1.68	3.35E-04	2.01E-05	1.84E-03	2.35E-03	1.41E-04	8.38E-04	6.37E-04	4.36E-04	3.52E-03	4.02E-05	3.52E-03
B1320	Hot water boiler	0.23	1.51	3.02E-04	1.81E-05	1.66E-03	2.12E-03	1.27E-04	7.56E-04	5.74E-04	3.93E-04	3.17E-03	3.63E-05	3.17E-03
B2041	Hot water boiler	0.134	0.88	1.76E-04	1.06E-05	9.68E-04	1.23E-03	7.40E-05	4.40E-04	3.35E-04	2.29E-04	1.85E-03	2.11E-05	1.85E-03
B165	Steam boiler	2.643	17.36	3.47E-03	2.08E-04	1.91E-02	2.43E-02	1.46E-03	8.68E-03	6.60E-03	4.51E-03	3.65E-02	4.17E-04	3.65E-02
B370	Hot water boiler	0.4	2.63	5.26E-04	3.15E-05	2.89E-03	3.68E-03	2.21E-04	1.31E-03	9.99E-04	6.83E-04	5.52E-03	6.31E-05	5.52E-03

Client:	Malmstrom AFB
Location:	Base-wide
Subject:	External Combustion - Natural Gas (excluding CHP boilers)

Date:	10/27/2000
Emissions:	Potential
Calc by:	*DDM*

B448	Hot water boiler	0.394	2.59	5.18E-04	3.11E-05	2.85E-03	3.62E-03	2.17E-04	1.29E-03	9.84E-04	6.73E-04	5.44E-03	6.21E-05	5.44E-03
B473	Hot water boiler	0.423	2.78	5.56E-04	3.33E-05	3.06E-03	3.89E-03	2.33E-04	1.39E-03	1.06E-03	7.23E-04	5.84E-03	6.67E-05	5.84E-03
B737	Hot water boiler	1.874	12.31	2.46E-03	1.48E-04	1.35E-02	1.72E-02	1.03E-03	6.16E-03	4.68E-03	3.20E-03	2.59E-02	2.95E-04	2.59E-02
B766	Steam boiler	5.976	39.26	7.85E-03	4.71E-04	4.32E-02	5.50E-02	3.30E-03	1.96E-02	1.49E-02	1.02E-02	8.25E-02	9.42E-04	8.25E-02
B1010	Steam boiler	1.445	9.49	1.90E-03	1.14E-04	1.04E-02	1.33E-02	7.97E-04	4.75E-03	3.61E-03	2.47E-03	1.99E-02	2.28E-04	1.99E-02
B1020	Steam boiler	2.386	15.68	3.14E-03	1.88E-04	1.72E-02	2.19E-02	1.32E-03	7.84E-03	5.96E-03	4.08E-03	3.29E-02	3.76E-04	3.29E-02
B1222	Hot water boiler	0.429	2.82	5.64E-04	3.38E-05	3.10E-03	3.95E-03	2.37E-04	1.41E-03	1.07E-03	7.33E-04	5.92E-03	6.76E-05	5.92E-03
B1240	Hot water boiler	1.5	9.86	1.97E-03	1.18E-04	1.08E-02	1.38E-02	8.28E-04	4.93E-03	3.74E-03	2.56E-03	2.07E-02	2.37E-04	2.07E-02
B1840	Hot water boiler	3.634	23.88	4.78E-03	2.87E-04	2.63E-02	3.34E-02	2.01E-03	1.19E-02	9.07E-03	6.21E-03	5.01E-02	5.73E-04	5.01E-02
B1840	Hot water boiler	1.549	10.18	2.04E-03	1.22E-04	1.12E-02	1.42E-02	8.55E-04	5.09E-03	3.87E-03	2.65E-03	2.14E-02	2.44E-04	2.14E-02
B1845	Hot water boiler	0.49	3.22	6.44E-04	3.86E-05	3.54E-03	4.51E-03	2.70E-04	1.61E-03	1.22E-03	8.37E-04	6.76E-03	7.73E-05	6.76E-03
B1867	Hot water boiler	0.349	2.29	4.59E-04	2.75E-05	2.52E-03	3.21E-03	1.93E-04	1.15E-03	8.71E-04	5.96E-04	4.82E-03	5.50E-05	4.82E-03
B1879	Hot water boiler	0.571	3.75	7.50E-04	4.50E-05	4.13E-03	5.25E-03	3.15E-04	1.88E-03	1.43E-03	9.75E-04	7.88E-03	9.00E-05	7.88E-03
B2040	Steam boiler	0.391	2.57	5.14E-04	3.08E-05	2.83E-03	3.60E-03	2.16E-04	1.28E-03	9.76E-04	6.68E-04	5.39E-03	6.17E-05	5.39E-03
B3063	Steam boiler	5.714	37.54	7.51E-03	4.50E-04	4.13E-02	5.26E-02	3.15E-03	1.88E-02	1.43E-02	9.76E-03	7.88E-02	9.01E-04	7.88E-02
B9001	Hot water boiler	4.781	31.41	6.28E-03	3.77E-04	3.46E-02	4.40E-02	2.64E-03	1.57E-02	1.19E-02	8.17E-03	6.60E-02	7.54E-04	6.60E-02
B1075	Steam boiler	11.954	78.54	1.57E-02	9.42E-04	8.64E-02	1.10E-01	6.60E-03	3.93E-02	2.98E-02	2.04E-02	1.65E-01	1.88E-03	1.65E-01

Natural gas combustion - all units (HAPs)

Facility	Use	Max. Rated Capacity MMBtu/hr	Natural gas Usage 10^6 ft^3	Formaldehyde Emissions Pounds	Hexane Emissions Pounds	Naphthalene Emissions Pounds	POM Emissions Pounds	Toluene Emissions Pounds
B330	Hot water boiler	0.174	1.14	8.57E-02	2.06E+00	6.97E-04	1.01E-04	3.89E-03
B1020	Hot water boiler	0.255	1.68	1.26E-01	3.02E+00	1.02E-03	1.47E-04	5.70E-03
B1320	Hot water boiler	0.23	1.51	1.13E-01	2.72E+00	9.22E-04	1.33E-04	5.14E-03
B2041	Hot water boiler	0.134	0.88	6.60E-02	1.58E+00	5.37E-04	7.75E-05	2.99E-03
B165	Steam boiler	2.643	17.36	1.30E+00	3.13E+01	1.06E-02	1.53E-03	5.90E-02
B370	Hot water boiler	0.4	2.63	1.97E-01	4.73E+00	1.60E-03	2.31E-04	8.94E-03
B448	Hot water boiler	0.394	2.59	1.94E-01	4.66E+00	1.58E-03	2.28E-04	8.80E-03
B473	Hot water boiler	0.423	2.78	2.08E-01	5.00E+00	1.70E-03	2.45E-04	9.45E-03
B737	Hot water boiler	1.874	12.31	9.23E-01	2.22E+01	7.51E-03	1.08E-03	4.19E-02
B766	Steam boiler	5.976	39.26	2.94E+00	7.07E+01	2.40E-02	3.46E-03	1.33E-01
B1010	Steam boiler	1.445	9.49	7.12E-01	1.71E+01	5.79E-03	8.35E-04	3.23E-02
B1020	Steam boiler	2.386	15.68	1.18E+00	2.82E+01	9.56E-03	1.38E-03	5.33E-02
B1222	Hot water boiler	0.429	2.82	2.11E-01	5.07E+00	1.72E-03	2.48E-04	9.58E-03
B1240	Hot water boiler	1.5	9.86	7.39E-01	1.77E+01	6.01E-03	8.67E-04	3.35E-02
B1840	Hot water boiler	3.634	23.88	1.79E+00	4.30E+01	1.46E-02	2.10E-03	8.12E-02
B1840	Hot water boiler	1.549	10.18	7.63E-01	1.83E+01	6.21E-03	8.96E-04	3.46E-02
B1845	Hot water boiler	0.49	3.22	2.41E-01	5.79E+00	1.96E-03	2.83E-04	1.09E-02
B1867	Hot water boiler	0.349	2.29	1.72E-01	4.13E+00	1.40E-03	2.02E-04	7.80E-03
B1879	Hot water boiler	0.571	3.75	2.81E-01	6.75E+00	2.29E-03	3.30E-04	1.28E-02
B2040	Steam boiler	0.391	2.57	1.93E-01	4.62E+00	1.57E-03	2.26E-04	8.73E-03
B3063	Steam boiler	5.714	37.54	2.82E+00	6.76E+01	2.29E-02	3.30E-03	1.28E-01
B9001	Hot water boiler	4.781	31.41	2.36E+00	5.65E+01	1.92E-02	2.76E-03	1.07E-01
B1075	Steam boiler	11.954	78.54	5.89E+00	1.41E+02	4.79E-02	6.91E-03	2.67E-01

Client: Malmstrom AFB
Location: Base-wide
Subject: External Combustion - Natural Gas (excluding CHP boilers)

Date: 10/27/2000
Emissions: Potential
Calc by: *DDM*

Potential Emissions Summary

	PM	PM_{10}	NO_x	SO_x	CO	VOC
Natural Gas Emissions (lb/yr)	2,382	2,382	31,305	188	26,093	1,723
Total Emissions (tons/yr)	1.19	1.19	15.65	0.09	13.05	0.86

	Arsenic	Beryllium	Cadmium	Chromium	Cobalt	Lead	Manganese	Mercury	Nickel	Selenium	Benzene
Natural Gas Emissions (lb/yr)	0.06	0.00	0.34	0.44	0.03	0.16	0.12	0.08	0.66	0.01	0.66
Total Emissions (tons/yr)	0.000031	0.000002	0.000172	0.000219	0.000013	0.000078	0.000060	0.000041	0.000329	0.000004	0.000329

	Formaldehyde	Hexane	Naphthalene	POM	Toluene
Natural Gas Emissions (lb/yr)	23.50	564.05	0.19	0.03	1.07
Total Emissions (tons/yr)	0.012	0.28	0.000096	0.000014	0.00053

Total HAPs
591.40
0.30

Client:	Malmstrom AFB	**Date:**	10/27/2000
Location:		**Emissions:**	Potential
Subject:	External Combustion - Waste Oil Burner	**Calc by:**	*DDM*

Parameter		Quantity	Units	Basis	
1. Emission Factors for Small Boilers					
Waste Oil Combustion					
PM	64A	5.12	$lb/10^3$ gal	Table 9-27 AEI Guidance Document	Assume ash content = 0.08% (residual oil - AP-40)
NO_x		19	$lb/10^3$ gal	Table 9-27 AEI Guidance Document	
SO_x (0.5% sulfur)	147s	411.6	$lb/10^3$ gal	Table 9-27 AEI Guidance Document	Assume sulfur content = 2.8 % wt
CO		5	$lb/10^3$ gal	Table 9-27 AEI Guidance Document	
VOC		1.0	$lb/10^3$ gal	Table 9-27 AEI Guidance Document	
where A = % ash and S = % sulfur		assumed			
2. HAP emission factors for waste oil combustion sources					
Antimony		BDL	$lb/10^3$ gal	Table 9-28 AEI Guidance Document	
Arsenic		1.10E-01	$lb/10^3$ gal	Table 9-28 AEI Guidance Document	
Beryllium		BDL	$lb/10^3$ gal	Table 9-28 AEI Guidance Document	
Cadmium		9.30E-03	$lb/10^3$ gal	Table 9-28 AEI Guidance Document	
Chromium		2.00E-02	$lb/10^3$ gal	Table 9-28 AEI Guidance Document	
Cobalt		2.10E-04	$lb/10^3$ gal	Table 9-28 AEI Guidance Document	
HCl	Assumed Cl negligible - no data available	66Cl	$lb/10^3$ gal	Table 9-28 AEI Guidance Document	Cl = wt% chlorine in fuel
Lead	Assumed lead negligible - no data avail.	55L	$lb/10^3$ gal	Table 9-28 AEI Guidance Document	L = wt% lead in fuel
Manganese		6.80E-02	$lb/10^3$ gal	Table 9-28 AEI Guidance Document	
Nickel		1.10E-02	$lb/10^3$ gal	Table 9-28 AEI Guidance Document	
Selenium		BDL	$lb/10^3$ gal	Table 9-28 AEI Guidance Document	
Phosphorous		ND	$lb/10^3$ gal	Table 9-28 AEI Guidance Document	
Bis (2-ethylhexyl)phthalate		ND	$lb/10^3$ gal	Table 9-28 AEI Guidance Document	
Dibutylphthalate		ND	$lb/10^3$ gal	Table 9-28 AEI Guidance Document	
Dichlorobenzene		ND	$lb/10^3$ gal	Table 9-28 AEI Guidance Document	
Naphthalene		ND	$lb/10^3$ gal	Table 9-28 AEI Guidance Document	
Phenol		ND	$lb/10^3$ gal	Table 9-28 AEI Guidance Document	
Polycyclic Organic Matter		ND	$lb/10^3$ gal	Table 9-28 AEI Guidance Document	
3. Waste oil usage (max. projected)		3,740	gallons	Actual 1999 usage x 8760 potential hours/2080 actual hours	
4. Waste oil heating value		140.00	$MMBtu/10^3$ gal	Table 9-2 AEI Guidance Document for distillate fuel oil	

Client: Malmstrom AFB
Location:
Subject: External Combustion - Waste Oil Burner

Date: 10/27/2000
Emissions: Potential
Calc by: *DDM*

Equation

Epol = F * EF

Epol = Emissions for a particular pollutant (lb/yr)
F = Fuel usage (MMcf/yr)
EF = Emission factor for a particular pollutant (lb/10^6 ft^3)

Waste Oil Fired Boilers

Facility	Use	Max. Rated Capacity MMBtu/hr	Waste oil Usage 1000 gal	PM Emissions Pounds	PM_{10} Emissions Pounds	NO_x Emissions Pounds	SO_x Emissions Pounds	CO Emissions Pounds	VOC Emissions Pounds
B870	Waste oil burner	0.225	3.740	19.15	19.15	71.06	1539.32	18.70	3.74

Facility	Use	Max. Rated Capacity MMBtu/hr	Waste oil Usage 1000 gal	Arsenic Emissions Pounds	Cadmium Emissions Pounds	Chromium Emissions Pounds	Cobalt Emissions Pounds	HCl Emissions Pounds	Lead Emissions Pounds	Manganese Emissions Pounds	Nickel Emissions Pounds
B870	Waste oil burner	0.225	3.740	4.11E-01	3.48E-02	7.48E-02	7.85E-04	0	0	2.54E-01	4.11E-02

Potential Emissions Summary

	PM	PM_{10}	NO_x	SO_x	CO	VOC
Emissions (lb/yr)	19.1	19.1	71.1	1,539.3	18.7	3.7
Total Emissions (tons/yr)	0.010	0.010	0.04	0.77	0.0093	0.0019

	Arsenic	Cadmium	Chromium	Cobalt	HCl	Lead	Manganese	Nickel
Emissions (lb/yr)	0.41	0.03	0.07	0.0008	0	0	0.25	0.04
Total Emissions (tons/yr)	0.000206	0.000017	0.000037	0.0000004	0	0	0.00013	0.000021

Total HAPs
0.8
0.0004

SECTION 8

FIRE FIGHTER TRAINING

Source Description

MAFB performs open burning of propane during fire fighter training. Fire at Air Force Bases is included in the two-digit SIC Code 97 for National Security and International Affairs. There are no appropriate SCC codes for fire fighter training at Air Force Bases.

Actual Emissions

Data for calculating emissions from the combustion of propane during fire fighter training were obtained from the MAFB Fire Department. Emissions from the combustion of liquid propane are based upon the pollutant specific emission factor and the quantity of fuel combusted. The emission factors are from sampling performed at Goodfellow AFB and described in the AEI Guidance Document. PM10 emissions were assumed to equal total particulate emissions. Total emissions are less than one ton per year with NO_X emissions the greatest at 262 lb/yr followed by VOCs at 113 lb/yr, CO at 72 lb/yr, and PM at 45 lb/yr. The only significant HAP emitted from the combustion of propane for fire fighter training at MAFB is formaldehyde at 3 lb/yr.

Potential Emissions

Potential emissions for fire fighter training are calculated based on the basewide ratio of 4.2 (8,760 potential hours/2,080 basewide hours). It is assumed that fire prevention staff will increase with base operations.

Potential emissions are estimated by multiplying the actual emissions for each pollutant by a factor of 4.2 (the above ratio). For example, potential NO_X emissions from fire fighter training are calculated to be 1,100 lb/yr as compared to actual emissions of 262 lb/yr.

References

1. U.S. Air Force Bioenvironmental Engineering Division, Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations, Brooks Air Force Base, TX 78235-5114, May 1999.

2. Environmental Quality Management, Emissions Testing of Fire Fighter Training Facility - Goodfellow AFB TX, January 1998.

3. U.S. Environmental Protection Agency, Compilation of Air Pollutant Emission Factors – Volume I: Stationary Point Source (AP-42), Section 13.3, February 1980 (Reformatted January 1995).

4. U.S. Army Defense Ammunition Center, Munitions Items Disposition Action System (MIDAS), Central Library Version 74, 1 May 1998.

5. Methodology and Technology for Identifying and Quantifying Emission Products from Open Burning and Open Detonation Thermal Treatment Methods, Field Test Series A, B, and C, Volume 1 – Test Summary, January 1992.

Client:	Malmstrom Air Force Base	**Date:**	8/24/00
Location:	Fire Fighter Training Center	**Emissions:**	Actual & Potential
Subject:	Fire Fighter Training	**Calc by:**	*SBH*

Emissions from the combustion of liquid propane are based upon the pollutant specific emission factor and the quantity of fuel combusted. JP-8 is not used at the fire fighter training center.

Epol = QF x EF

Epol = Emissions of a particular pollutant (lbs/yr)
QF = Quantity of fuel burned (gal/yr)
EF = Emission factor (lbs/gal)
Emission factors obtained from AEI guidance document

Actual Emissions:

Pollutant	Quantity of liquid propane burned, (gal/yr)		Emission factor, (lbs/gal)		Actual Emissions, (lb/yr)	Actual Emissions, (tpy)
CO	4700	x	0.0154	=	72	0.04
NOx	4700	x	0.0557	=	262	0.13
PM	4700	x	0.0095	=	45	0.02
VOC	4700	x	0.024	=	113	0.06
Formaldehyde	4700	x	0.0007	=	3	0.002

Note: PM10 emissions assumed equal to PM emissions.

Potential Emissions:

Potential emissions are calculated using the basewide ration of 4.2. (8760 potential hours / 2080 basewide hours)
Potential emissions = acutal emissions x 4.2

Pollutant	Quantity of liquid propane burned, (gal/yr)		Emission factor, (lbs/gal)		Actual Emissions, (lb/yr)	Actual Emissions, (tpy)
CO	19740	x	0.0154	=	304	0.15
NOx	19740	x	0.0557	=	1100	0.55
PM	19740	x	0.0095	=	188	0.09
VOC	19740	x	0.024	=	474	0.24
Formaldehyde	19740	x	0.0007	=	14	0.007

Note: PM10 emissions assumed equal to PM emissions.

SECTION 9

FUEL SPILLS

Source Description

Spills at MAFB include diesel, fuel oil No. 2 (considered identical to diesel for emissions estimation), JP-8, gasoline, and oil. They are included in the two-digit SIC Code 97 for National Security and International Affairs. The applicable source classification code is SCC 40600402 - Liquid Spill Loss Without Controls.

A record of materials spilled at MAFB is kept in spill logbooks for both reportable and nonreportable spills. All recorded spill events in 1999 were used to determine VOC and HAP emissions from spills. The spill totals for 1999 were 22 gallons for diesel fuel, 20 gallons of hydraulic fluid, 1 pint of gasoline, and 1 quart of motor oil. There were no recorded spills for JP-8 in 1999.

Actual Emissions

VOC emissions from fuel spills were calculated using a material balance approach. The net result of the total fuel spills minus the recovered material is considered emissions to the atmosphere. Although there were no estimates of spill recovery in the spill logbooks, absorbent pads were used to collect free liquids after a spill occurred. The overall spill recovery efficiency was assumed to be 75%. No absorbents were used on the 20 gallon diesel fuel spill and therefore a 0 percent recovery was assumed.

VOC emissions from spills were estimated to be 182 lb/yr. HAP emissions were calculated based on the spill emissions and a typical weight percent for each HAP in the spilled material (liquid phase) as reported in the AEI guidance document. The weight percent of the HAP in the liquid phase was used because all the HAPs in the unrecovered fuel evaporate (although at different evaporation rates). The largest emission of a HAP was xylenes (mixed isomers) at 1.2 lb/yr. A complete listing of HAP emissions from spills is included in the calculation sheets.

Potential Emissions

The potential emissions from spills are related to the frequency of operations that can result in spills such as tank fill-ups, transfer of fuel to vehicles, and line ruptures. Potential emissions from spills were estimated based on the ratio of the potential number of operating hours (8,760 hours) to the actual operating hours (2,080 hours). This ratio is 4.2. Potential emissions from spills were estimated to be 766 lb/yr.

References

1. Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations, Section 9, May 1999.

2. American Petroleum Institute, Manual of Petroleum Measurements Standards: Chapter 19.4 – Recommended Practice for Speciation of Evaporative Losses, First Edition, November 1997.

3. U.S. Air Force Armstrong Laboratory, Environmental Research Division (AL/EQL), JP-8 Composition and Variability, Report # AL/EQ-TR-1996-0006, May 1996.

Client:	Malmstrom AFB	**Date:**	9/5/2000
Location:	Spills Basewide	**Emissions:**	Actual and Potential
Subject:	Emissions from Spills	**Calc by:**	*SBH*

VOC emissions from fuel spills are calculated using a material balance approach. Both reportable and non-reportable spills for 1999 were reviewed to determine the total spills for diesel fuel, hydraulic fluid, gasoline, and motor oil. A summary of the spills is provided below.

Material Spilled	How Treated	Quantity (gal)	Date	Location
Diesel Fuel	Absorbed into asphalt	20	14-Jan	Bldg. 3080
Hydraulic Fluid	Cleaned up with absorbents	1	21-Apr	Clinic lot
Gasoline	Cleaned up with spill pads	0.125	26-Jul	Bldg. 470
Motor Oil*	Cleaned up with absorbents	0.25	9-Jul	Dorm 737 lot
Hydraulic Fluid	Absorbed into gravel - soil excavated	19	10-Aug	Rivet Mile
Diesel Fuel	Contained and cleaned up	1	26-Oct	Military gas station
Diesel Fuel	Absorbed by absorbents	1	28-Sep	Military gas station

*Quantity not provided, typical consumer size assumed as it was spilled in the dorm parking lot

A recovery rate of 75% was assumed to calculate VOC emissions from spills, with the exception of diesel fuel spilled on January 14. 0% recovery was assumed in this case.

Material	1999 Spill Quantity (gal)	Density	Recovery
Diesel Fuel	20.0 gal	7.1 lb/gal	0%
Hydraulic Fluid	1.0 gal	7.3 lb/gal	75%
Gasoline	0.125	6.0 lb/gal	75%
Motor Oil	0.250	7.3 lb/gal	75%
Hydraulic Fluid	19.0 gal	7.3 lb/gal	75%
Diesel Fuel	1.0 gal	7.1 lb/gal	75%
Diesel Fuel	1.0 gal	7.1 lb/gal	75%

VOC Emissions (lb/yr) = (Quantity Spilled (gal) - Quantity Recovered (gal)) X Fuel Density (lb/gal)

Actual

Diesel Fuel	VOC = (20 - (20 x 0)) X 7.1 =	142 lb/yr
Hydraulic Fluid	VOC = (1 - (1 x 0.75)) X 7.26 =	2 lb/yr
Gasoline	VOC = (0.125 - (0.125 x 0.75)) X 6 =	0 lb/yr
Motor Oil	VOC = (0.25 - (0.25 x 0.75)) X 7.3 =	0 lb/yr
Hydraulic Fluid	VOC = (19 - (19 x 0.75)) X 7.26 =	34 lb/yr
Diesel Fuel	VOC = (1 - (1 x 0.75)) X 7.1 =	2 lb/yr
Diesel Fuel	VOC = (1 - (1 x 0.75)) X 7.1 =	2 lb/yr
		0 lb/yr
	Total VOCs from Spills =	**182 lb/yr**
	=	**0.091 ton/yr**

Potential emissions are based on the potential number of aircraft which may be assigned to the base as suggested in
The ratio of potential vs. current number of aircraft at MAFB has been calculated to be
4.2. **Potential VOCs from spills are calculated as follows:**

1999 VOCs X potential vs. current ratio = potential VOC emissions

182.49375 lb in 1999 x 4.2 = 766 lb VOC potential

The AEI guidance document provides typical HAP compositions for diesel fuel and JP-8.
Based on the MSDS, no HAPs are present in motor oil and hydraulic fluid.
HAP emissionsfor spills are calculated based on the liquid phase speciation of the appropriate material:

	Weight Percent in Liquid-Phase					
HAP Component	**Gasoline**	**Motor Oil**	**Diesel and Fuel Oil No. 2**	**Hydraulic Fluid**	**JP-8**	**Motor Oil**
Benzene	1.8	-	0.2	-	0.033	
Cumene	0.5	-	0.1	-	0.179	
Ethylbenzene	1.4	-	0.2	-	0.157	
n-Hexane	1	-	0.04	-	-	
Naphthalene	0.3	-	0.2	-	0.264	
Toluene	7	-	0.4	-	0.216	
Xylenes (mixed isomers)	7	-	0.8	-	1.173	
2,2,4-Tri-methylpentane	4	-	-	-	0.001	
Methyl tert-butyl ether	4.5	-	-	-	-	

Client:	Malmstrom AFB	**Date:**	9/5/2000
Location:	Spills Basewide	**Emissions:**	Actual and Potential
Subject:	Emissions from Spills	**Calc by:**	*SBH*

The HAP emissions are calculated by: VOC emissions X Wght % liquid phase / 100

For example: **Benzene emissions = Diesel VOC lb/yr x Wght % Bzn./100 + JP-8 VOC lb/yr x Wght % Bzn./100**

Benzene emissions = 145.55 lb/yr x 0.2%/100 + 142 lb/yr x 0.033%/100 = **0.05** **lbs/yr**

	HAP Emissions, lb/yr 1999			
HAP Component	**Gasoline**	**Diesel and Fuel Oil No. 2**	**JP-8**	**Total HAP**
Benzene	0.0	0.3	0.0	**0.3**
Cumene	0.0	0.1	0.0	**0.1**
Ethylbenzene	0.0	0.3	0.0	**0.3**
n-Hexane	0.0	0.1	0.0	**0.1**
Naphthalene	0.0	0.3	0.0	**0.3**
Toluene	0.0	0.6	0.0	**0.6**
Xylenes (mixed isomers)	0.0	1.2	0.0	**1.2**
2,2,4-Tri-methylpentane	0.0	-	0.0	**0.0**
Methyl tert-butyl ether	0.0	-	0.0	**0.0**
			Total Actual HAPs, lb/yr =	**2.9**
			Total Actual HAPs, ton/yr =	**0.001**

Potential HAP emissions are calculated using the 4.2 scaleup factor described above

	Potential HAP Emissions, lb/yr			
HAP Component	**Gasoline**	**Diesel and Fuel Oil No. 2**	**JP-8**	**Total HAP**
Benzene	0.0	1.2	0.0	**1.2**
Cumene	0.0	0.6	0.0	**0.6**
Ethylbenzene	0.0	1.2	0.0	**1.2**
n-Hexane	0.0	0.2	-	**0.3**
Naphthalene	0.0	1.2	0.0	**1.2**
Toluene	0.1	2.4	0.0	**2.5**
Xylenes (mixed isomers)	0.1	4.9	0.0	**4.9**
2,2,4-Tri-methylpentane	0.0	-	0.0	**0.0**
Methyl tert-butyl ether	0.0	-	-	**0.0**
			Total Potential HAPs, lb/yr =	**12.1**
			Total Potential HAPs, ton/yr =	**0.006**

SECTION 10

FUEL STORAGE

Source Description

MAFB operates storage tanks containing diesel fuel, fuel oil No. 2 (identical to diesel with respect to physical and chemical properties), gasoline, JP-8 aircraft fuel, and waste oils. Storage tanks at Air Force Bases are included in the two-digit SIC Code 97 for National Security and International Affairs. The following table gives the applicable SCC for the tanks at MAFB.

SCC	Description
40301008	Fixed Roof Tanks – Gasoline RVP 10: Working Loss (Tank Diameter Independent)
40301021	Fixed Roof Tanks – Distillate Fuel #2: Working Loss (Tank Diameter Independent)
40301099	Fixed Roof Tanks – Specify Liquid: Working Loss (Tank Diameter Independent) (waste oil)
40301119	Floating Roof Tanks – Jet Kerosene: Withdrawal Loss
40301154	Floating Roof Tanks – Jet Kerosene: Standing Loss, Internal
40301197	Floating Roof Tanks – Specify Liquid: Withdrawal Loss
40400403	Underground Tanks – Gasoline RVP 10: Breathing Loss
40400404	Underground Tanks – Gasoline RVP 10: Working Loss
40400413	Underground Tanks – Distillate Fuel #2: Breathing Loss
40400414	Underground Tanks – Distillate Fuel #2: Working Loss

Actual Emissions

Data for calculating fuel storage emissions was obtained from MAFB fuel purchasing records, base personnel, current MAFB storage tank listings, and field observations. Emissions from oil/water separator tanks, wastewater storage tanks, and anti-freeze tanks were not estimated due to their insignificant emission contribution.

The TANKS 4.0 program was used for above-ground storage tanks (AST) that would have working and breathing losses. Due to the difficulty in obtaining tank dimensions required in TANKS 4.0 for many of the smaller storage tanks, a simplified working loss equation was used to estimate VOC emissions from underground storage tanks (UST) and indoor ASTs (i.e., those tanks that would not have breathing losses). The simplified equation is based on AP-42 4th Edition, September 1985. A spreadsheet is provided that summarizes tank data and tank emissions. A TANKS 4.0 printout for the VOC emissions from the larger outdoor storage tanks at MAFB and data input table are located in Appendix B.

Gasoline use was provided by base personnel for each delivery location. The BX gas station includes Stage I Vapor Control that reduces working (filling) losses by 95%; the military gas station does not employ Stage I Vapor Control. Total basewide diesel and No. 2 fuel oil usage was provided by base personnel and allocated to each tank based on tank size.

Actual VOC emissions from storage tanks were estimated to be 2,673 lb/yr (1.3 tpy) in 1999. This includes diesel and fuel oil (7.3 lb), gasoline (2,655 lb), JP-8 (10.3 lb), and waste oil (< 1 lb) tank emissions.

HAP emissions from storage tanks are estimated by multiplying the VOC emissions by the weight percent of the HAP in the vapor phase. This takes into account that the concentrations of the various chemical constituents in the vapors in the tank vapor space are related to their vapor pressures and vary from the liquid phase composition. The greatest HAP emission is methy tert-butyl ether at 122 lb/yr. Other HAPs were emitted at less than 50 lb/.

Potential Emissions

Potential emissions were calculated based on the ratio of the potential number of operating hours (8,760 hours) to the actual number of operating hours in 1999 (2,080 hours). This results in a ratio of 4.2. Potential emissions were estimated by multiplying the actual emissions for VOCs and HAPs by 4.2. As a result, potential VOC emissions were estimated to be 11,226 lb/yr (5.6 tpy) and potential HAPs were estimated to be 828 lb/yr (0.4 tpy).

References

1. Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations, Section 9, May 1999.

2. U.S. Environmental Protection Agency, Compilation of Air Pollutant Emission Factors – Volume I: Stationary Point Source (AP-42), Chapter 7, February 1996 and September 1985.

3. U.S. Environmental Protection Agency, User's Guide to TANKS Storage Tank Emission Calculation Software Version 4.0, December 1999.

4. American Petroleum Institute, Manual of Petroleum Measurements Standards: Chapter 19.4 – Recommended Practice for Speciation of Evaporative Losses, First Edition, November 1997.

5. U.S. Air Force Armstrong Laboratory, Environmental Research Division (AL/EQL), JP-8 Composition and Variability, Report # AL/EQ-TR-1996-0006, May 1996.

6. U.S. Environmental Protection Agency, Technical Support Document for Development of a Comparable Fuel Exemption, Draft Version, February 1996.

Client:	Malmstrom AFB	**Date:**	12/07/2000
Location:	Storage Tanks Basewide	**Emissions:**	Actual and Potential
Subject:	Storage Tank Emissions	**Calc by:**	*DDM*

MAFB operated storage tanks containing diesel fuel, fuel oil No. 2 (generally identical to diesel), gasoline, JP-8 aircraft fuel, and waste oils.

Actual VOC emissions from storage tanks are calculated as follows:

The AEI guidance document specifies that EPA's TANKS 3.1 program be used to calculate VOC emissions. The updated TANKS 4.0 program was used for those tanks for which specifications (e.g., diameter, height, seal types, etc.) were known. For others, a simplified working loss equation was used. The equation is from AP-42 4th Edition September 1985 and is slightly more conservative than TANKS

$$\text{VOC working loss emissions} = \frac{[\text{1999 Throughput (gal) x VOC Molecular Weight (lb/mol) * Partial Pressure (psi) * Kn * Kc}]}{[14.7 * 7.4805 * \text{Molar Volume of Air at Given Temperature (cf/mol)}]}$$

Liquid Stored	Summary of Actual Emissions (See individual tank list for individual VOC emissions)
Diesel and Fuel Oil No. 2 Tanks	7.3 lb
Gasoline Tanks	2655.2 lb
JP-8 Tanks	10.3 lb
Waste oil tanks	0.00251 lb
Total Actual VOC Emissions:	**2672.7 lb**
	1.3 tons

Potential VOCs from storage tanks are calculated as follows:

Potential emissions are based on the potential number of operating hours versus the actual number.
Ratio = 8760/2080 = 4.2

1999 VOCs X potential vs. current ratio = potential VOC emissions

2,673 lb in 1999 X 4.2	**=**	**11,226**	**lb VOC potential**
	=	**5.613**	**ton VOC potential**

HAP emissions from storage tanks are calculated as follows:

The AEI guidance document provides typical HAP compositions for diesel fuel, JP-8, and gasoline. HAP emissions are calculated based on the vapor phase speciation of the appropriate material also provided in the AEI guidance:

Client:	Malmstrom AFB	**Date:**	12/07/2000
Location:	Storage Tanks Basewide	**Emissions:**	Actual and Potential
Subject:	Storage Tank Emissions	**Calc by:**	*DDM*

	Weight Percent in Vapor-Phase		
HAP Component	**Gasoline**	**Diesel and Fuel Oil No. 2**	**JP-8**
Benzene	0.6	7.2	0.613
Cumene	0.02	0.4	0.330
Ethylbenzene	0.04	0.7	0.271
n-Hexane	0.5	2.3	-
Naphthalene	0	0	0.003
Toluene	0.7	4.1	1.143
Xylenes (mixed isomers)	0.2	2.5	1.877
2,2,4-Tri-methylpentane	0.7	-	0.010
Methyl tert-butyl ether	4.6	-	-

The HAP emissions are calculated by: VOC emissions X Wght % vapor phase / 100

For example, benzene from gasoline =	**15.93 lb/yr**
Benzene from diesel and fuel oil =	**0.53 lb/yr**
Benzene from JP-8 =	**0.06 lb/yr**
Total Benzene =	**16.52 lb/yr**

	Actual HAP Emissions, lb/yr			
HAP Component	**Gasoline**	**Diesel and Fuel Oil No. 2**	**JP-8**	**Total HAP**
Benzene	15.9	0.5	0.1	**16.5 lb/yr**
Cumene	0.5	0.0	0.0	**0.6 lb/yr**
Ethylbenzene	1.1	0.1	0.0	**1.1 lb/yr**
n-Hexane	13.3	0.2	-	**13.4 lb/yr**
Naphthalene	0.0	0.0	0.0	**0.0 lb/yr**
Toluene	18.6	0.3	0.1	**19.0 lb/yr**
Xylenes (mixed isomers)	5.3	0.2	0.2	**5.7 lb/yr**

Client: Malmstrom AFB
Location: Storage Tanks Basewide
Subject: Storage Tank Emissions

Date: 12/07/2000
Emissions: Actual and Potential
Calc by: *DDM*

2,2,4-Tri-methylpentane	18.6	-	0.0	**18.6 lb/yr**
Methyl tert-butyl ether	122.1	-	-	**122.1 lb/yr**
			Total Actual HAPs:	**197.1 lb/yr**
			Total Actual HAPs:	**0.099ton/yr**

Potential HAP emissions are calculated using the 4.2 escalation factor described above

	Potential HAP Emissions, lb/yr			
HAP Component	**Gasoline**	**Diesel and Fuel Oil No. 2**	**JP-8**	**Total HAP**
Benzene	66.9	2.2	0.3	**69.4 lb/yr**
Cumene	2.2	0.1	0.1	**2.5 lb/yr**
Ethylbenzene	4.5	0.2	0.1	**4.8 lb/yr**
n-Hexane	55.8	0.7	-	**56.5 lb/yr**
Naphthalene	0.0	0.0	0.0	**0.0 lb/yr**
Toluene	78.1	1.3	0.5	**79.8 lb/yr**
Xylenes (mixed isomers)	22.3	0.8	0.8	**23.9 lb/yr**
2,2,4-Tri-methylpentane	78.1	-	0.0	**78.1 lb/yr**
Methyl tert-butyl ether	513.0	-	-	**513.0 lb/yr**
			Total Potential HAPs:	**827.9 lb/yr**
			Total Potential HAPs:	**0.414ton/yr**

Client: Malmstrom AFB
Location: Storage Tanks Basewide
Subject: Storage Tank Emissions

Date: 12/07/2000
Emissions: Actual and Potential
Calc by: *DDM*

Building	Tank ID	Description	Contents	Capacity, gal	1999 Throughput, gal	VOC MW, lb/mol	VOC Avg Pv, psi	Fraction VOC	Mol fraction	Partial pressure, psi	(N)	(Kn)	(Kc)	Molar volume of air at given T, ft3/mol	Tank working VOC emissions, lbs/yr	Tank breathing VOC emissions, lbs/yr*	Comments
430	Mil Service Sta D-1	AST	Diesel	450,000	59,724	130	0.009	1	1.00	0.009	0.1	1	1	386	1.65	0	Tanker truck to tank B430; then tank to tanker truck (100%); truck to tanks ((generator, heating tanks-40000 gal)+(missile complex tanks, red horse heavy equipment) - 5000 gal))
145	Generator tank	AST-inside	Diesel	480	408	130	0.009	1	1.00	0.009	0.9	1	1	386	0.01	0	Throughput scaled based on tank capacity
152	Generator tank	AST-inside	Diesel	275	234	130	0.009	1	1.00	0.009	0.9	1	1	386	0.01	0	Throughput scaled based on tank capacity
160	Generator tank	AST-inside	Diesel	275	234	130	0.009	1	1.00	0.009	0.9	1	1	386	0.01	0	Throughput scaled based on tank capacity
200	Generator tank	AST	Diesel	125	106	130	0.009	1	1.00	0.009	0.9	1	1	386	0.003	0	Throughput scaled based on tank capacity
219	Generator tank	AST	Diesel	212	180	130	0.009	1	1.00	0.009	0.9	1	1	386	0.00	0	Throughput scaled based on tank capacity
219	Generator tank	AST-inside	Diesel	98	83	130	0.009	1	1.00	0.009	0.9	1	1	386	0.002	0	Throughput scaled based on tank capacity
219	Generator tank	AST-inside	Diesel	94	80	130	0.009	1	1.00	0.009	0.9	1	1	386	0.002	0	Throughput scaled based on tank capacity
249	Generator tank	AST	Diesel	150	128	130	0.009	1	1.00	0.009	0.9	1	1	386	0.00	0	Throughput scaled based on tank capacity
295	Generator tank	UST	Diesel	600	510	130	0.009	1	1.00	0.009	0.9	1	1	386	0.01	0	Throughput scaled based on tank capacity
295	Generator tank	AST	Diesel	10	9	130	0.009	1	1.00	0.009	0.9	1	1	386	0.0002	0	Throughput scaled based on tank capacity
349	Generator tank	AST	Diesel	300	255	130	0.009	1	1.00	0.009	0.9	1	1	386	0.01	0	Throughput scaled based on tank capacity
407	Generator tank	AST	Diesel	150	128	130	0.009	1	1.00	0.009	0.9	1	1	386	0.00	0	Throughput scaled based on tank capacity
429	Generator tank	AST	Diesel	75	64	130	0.009	1	1.00	0.009	0.9	1	1	386	0.002	0	Throughput scaled based on tank capacity
496	Generator tank	AST-inside	Diesel	75	64	130	0.009	1	1.00	0.009	0.9	1	1	386	0.002	0	Throughput scaled based on tank capacity
500	Generator tank	AST-inside	Diesel	335	285	130	0.009	1	1.00	0.009	0.9	1	1	386	0.01	0	Throughput scaled based on tank capacity
500	Generator tank	AST	Diesel	10000	8505	130	0.009	1	1.00	0.009	0.9	1	1	386	0.23	0	Throughput scaled based on tank capacity
530	Generator tank	AST	Diesel	135	115	130	0.009	1	1.00	0.009	0.9	1	1	386	0.003	0	Throughput scaled based on tank capacity
769	Generator tank	AST	Diesel	270	230	130	0.009	1	1.00	0.009	0.9	1	1	386	0.01	0	Throughput scaled based on tank capacity
910	Generator tank	AST	Diesel	75	64	130	0.009	1	1.00	0.009	0.9	1	1	386	0.002	0	Throughput scaled based on tank capacity
1082	Generator tank	UST	Diesel	1000	851	130	0.009	1	1.00	0.009	0.9	1	1	386	0.02	0	Throughput scaled based on tank capacity
1082	Generator tank	AST	Diesel	25	21	130	0.009	1	1.00	0.009	0.9	1	1	386	0.001	0	Throughput scaled based on tank capacity
1320	Generator tank	AST-inside	Diesel	25	21	130	0.009	1	1.00	0.009	0.9	1	1	386	0.001	0	Throughput scaled based on tank capacity
1439	Generator tank	AST	Diesel	192	163	130	0.009	1	1.00	0.009	0.9	1	1	386	0.00	0	Throughput scaled based on tank capacity
1439	Generator tank	AST	Diesel	745	634	130	0.009	1	1.00	0.009	0.9	1	1	386	0.02	0	Throughput scaled based on tank capacity
1440	Generator tank	UST	Diesel	750	638	130	0.009	1	1.00	0.009	0.9	1	1	386	0.02	0	Throughput scaled based on tank capacity
1440	Generator tank	AST	Diesel	50	43	130	0.009	1	1.00	0.009	0.9	1	1	386	0.001	0	Throughput scaled based on tank capacity
1459	Generator tank	AST-inside	Diesel	300	255	130	0.009	1	1.00	0.009	0.9	1	1	386	0.01	0	Throughput scaled based on tank capacity
1459	Generator tank	AST-inside	Diesel	300	255	130	0.009	1	1.00	0.009	0.9	1	1	386	0.01	0	Throughput scaled based on tank capacity
1459	Generator tank	AST-inside	Diesel	300	255	130	0.009	1	1.00	0.009	0.9	1	1	386	0.01	0	Throughput scaled based on tank capacity
1482	Generator tank	AST	Diesel	500	425	130	0.009	1	1.00	0.009	0.9	1	1	386	0.01	0	Throughput scaled based on tank capacity
1831	Generator tank	UST	Diesel	6000	5103	130	0.009	1	1.00	0.009	0.9	1	1	386	0.14	0	Throughput scaled based on tank capacity
1831	Generator tank	AST	Diesel	295	251	130	0.009	1	1.00	0.009	0.9	1	1	386	0.01	0	Throughput scaled based on tank capacity
1839	Generator tank	AST	Diesel	300	255	130	0.009	1	1.00	0.009	0.9	1	1	386	0.01	0	Throughput scaled based on tank capacity
1845	Generator tank	AST	Diesel	100	85	130	0.009	1	1.00	0.009	0.9	1	1	386	0.002	0	Throughput scaled based on tank capacity
1845	Heating oil	UST	Diesel	3000	2552	130	0.009	1	1.00	0.009	0.9	1	1	386	0.07	0	Throughput scaled based on tank capacity
1879	Generator tank	AST	Diesel	2000	1701	130	0.009	1	1.00	0.009	0.9	1	1	386	0.05	0	Throughput scaled based on tank capacity
1881	Generator tank	AST-inside	Diesel	120	102	130	0.009	1	1.00	0.009	0.9	1	1	386	0.003	0	Throughput scaled based on tank capacity
1884	Generator tank	AST	Diesel	2500	2126	130	0.009	1	1.00	0.009	0.9	1	1	386	0.06	0	Throughput scaled based on tank capacity
1996	Generator tank	AST	Diesel	200	170	130	0.009	1	1.00	0.009	0.9	1	1	386	0.00	0	Throughput scaled based on tank capacity
2040	Generator tank	UST	Diesel	8000	6804	130	0.009	1	1.00	0.009	0.9	1	1	386	0.19	0	Throughput scaled based on tank capacity
2040	Generator tank	AST	Diesel	295	251	130	0.009	1	1.00	0.009	0.9	1	1	386	0.01	0	Throughput scaled based on tank capacity

Client:	Malmstrom AFB	Date:	12/07/2000
Location:	Storage Tanks Basewide	Emissions:	Actual and Potential
Subject:	Storage Tank Emissions	Calc by:	DDM

Building	Tank ID	Description	Contents	Capacity, gal	1999 Throughput, gal	VOC MW, lb/mol	VOC Avg Pv, psi	Fraction VOC	Mol fraction	Partial pressure, psi	(N)	(Kn)	(Kc)	Molar volume of air at given T, ft3/mol	Tank working VOC emissions, lbs/yr	Tank breathing VOC emissions, lbs/yr*	Comments
3080	Generator tank	AST	Diesel	300	255	130	0.009	1	1.00	0.009	0.9	1	1	386	0.01	0	Throughput scaled based on tank capacity
82110	Generator tank	AST	Diesel	6000	5103	130	0.009	1	1.00	0.009	0.9	1	1	386	0.14	0	Throughput scaled based on tank capacity
	Total small diesel storage tank capacity			47031	40000 Gallons trucked to generator tanks in 1999 (Mike Foran)												
* Breathing losses could not be determined because tank dimensions could not be obtained. However, breathing losses are zero for indoor and underground tanks and would be negligible for all other tanks.																	
430	Mil Service Sta	AST	Diesel (DL1)	10,000	43,562	130	0.009	1	1.00	0.009	4.4	1	1	386	1.2	0	Tanker truck to storage tank, 100% from tank to vehicles/equipment
430	Mil Service Sta	AST	Diesel (DL2)	10,000	100,792	130	0.009	1	1.00	0.009	10.1	1	1	386	2.8	0	Tanker truck to storage tank, 100% from tank to vehicles/equipment
1890	Vehicle	AST	Diesel	100	1200	130	0.009	1	1.00	0.009	12.0	1	1	386	0.03	0	Assumed 1 turnover per month
1468	Vehicle-Red Horse	AST	Diesel	2000	20000	130	0.009	1	1.00	0.009	10.0	1	1	386	0.55	0	Throughput estimate - Mike Foran
								TOTAL VOC FROM DIESEL TANK WORKING AND BREATHING LOSSES, LBS							7.31		

Client: Malmstrom AFB
Location: Storage Tanks Basewide
Subject: Storage Tank Emissions

Date: 12/07/2000
Emissions: Actual and Potential
Calc by: *DDM*

Building	Tank ID	Description	Contents	Capacity, gal	1999 Throughput, gal	VOC MW, lb/mol	VOC Avg Pv, psi	Fraction VOC	Mol fraction	Partial pressure, psi	(N)	(Kn)	(Kc)	Molar volume of air at given T, ft3/mol	Tank working VOC emissions, lbs/yr	Tank breathing VOC emissions, lbs/yr*	Comments
430	Mil Service Sta	AST	Gasoline	10,000	149,897	68	4.92	1	1	4.920	15.0	1	1	386	933.0	730	Tank dimensions not obtained but estimated
685	BX Gas Station	UST	Gasoline	10,000	168,148	68	4.92	1	1	4.920	16.8	1	1	386	66.2	0	Emissions reflect 95% control efficiency from Stage I Vapor Control. All to vehicles at station.
685	BX Gas Station	UST	Gasoline	10,000	168,148	68	4.92	1	1	4.920	16.8	1	1	386	66.2	0	Emissions reflect 95% control efficiency from Stage I Vapor Control. All to vehicles at station.
685	BX Gas Station	UST	Gasoline	10,000	168,148	68	4.92	1	1	4.920	16.8	1	1	386	66.2	0	Emissions reflect 95% control efficiency from Stage I Vapor Control. All to vehicles at station.
685	BX Gas Station	UST	Gasoline	10,000	168,148	68	4.92	1	1	4.920	16.8	1	1	386	66.2	0	Emissions reflect 95% control efficiency from Stage I Vapor Control. All to vehicles at station.
1470	Vehicle-Red Horse	AST	Gasoline	1000	12000	68	4.92	1	1	4.920	12.0	USED TANKS 4.0			74.70	117	230 gal/wk average - Mike Foran
1831	Vehicle	AST	Gasoline	500	6000	68	4.92	1	1	4.920	12.0	USED TANKS 4.0			37.30	71	Assumed 1 turnover per month
1832	Motor fuel	UST	Gasoline	4000	48000	68	4.92	1	1	4.920	12.0	1	1	386	378.05	0	Assumed 1 turnover per month
1890	Vehicle	AST	Gasoline	100	1200	68	4.92	1	1	4.920	12.0	USED TANKS 4.0			7.46	43	Assumed 1 turnover per month
								TOTAL VOC FROM GASOLINE TANK WORKING AND BREATHING LOSSES, LBS							**2655.18**		

Client: Malmstrom AFB
Location: Storage Tanks Basewide
Subject: Storage Tank Emissions

Date: 12/07/2000
Emissions: Actual and Potential
Calc by: *DDM*

Building	Tank ID	Description	Contents	Capacity, gal	1999 Throughput, gal	VOC MW, lb/mol	VOC Avg Pv, psi	Fraction VOC	Mol fraction	Partial pressure, psi	(N)	(Kn)	(Kc)	Molar volume of air at given T, ft3/mol	Tank working VOC emissions, lbs/yr	Tank breathing VOC emissions, lbs/yr*	Comments
200	Waste Oil	UST	Waste oil	500	231	190	0.00006	1	1	0.000060	0.5	1	1	386	0.00006	0	
320	Waste Oil	UST	Waste oil	600	277	190	0.00006	1	1	0.000060	0.5	1	1	386	0.00007	0	
685	Waste Oil	UST	Waste oil	11000	5085	190	0.00006	1	1	0.000060	0.5	1	1	386	0.00136	0	
870	Waste Oil	UST	Waste oil	5000	2311	190	0.00006	1	1	0.000060	0.5	1	1	386	0.00062	0	
1408	Waste Oil	AST-inside	Waste oil	275	127	190	0.00006	1	1	0.000060	0.5	1	1	386	0.00003	0	
1450	Waste Oil	UST	Waste oil	550	254	190	0.00006	1	1	0.000060	0.5	1	1	386	0.00007	0	
1464	Waste Oil	UST	Waste oil	550	254	190	0.00006	1	1	0.000060	0.5	1	1	386	0.00007	0	
2040	Waste Oil	UST	Waste oil	550	254	190	0.00006	1	1	0.000060	0.5	1	1	386	0.00007	0	
2040	Waste Oil	UST	Waste oil	600	277	190	0.00006	1	1	0.000060	0.5	1	1	386	0.00007	0	
3081	Waste Oil	UST	Waste oil	600	277	190	0.00006	1	1	0.000060	0.5	1	1	386	0.00007	0	Temp closed 2/24/2000
				Total gallons throughput, 1999=		9350		TOTAL VOC FROM WASTE OIL TANK WORKING AND BREATHING LOSSES, LBS							0.00251		
* Breathing losses zero for indoor and underground tanks.																	

Client: Malmstrom AFB
Location: Storage Tanks Basewide
Subject: Storage Tank Emissions

Date: 12/07/2000
Emissions: Actual and Potential
Calc by: *DDM*

Building	Tank ID	Description	Contents	Capacity, gal	1999 Throughput, gal	VOC MW, lb/mol	VOC Avg Pv, psi	Fraction VOC	Mol fraction	Partial pressure, psi	(N)	(Kn)	(Kc)	Molar volume of air at given T, ft3/mol	Tank working VOC emissions, lbs/yr	Tank breathing VOC emissions, lbs/yr*	Comments
1480	JP-8 Aircraft refueling product recovery tank	UST	JP-8	4000	48000	130	0.011	1	1	0.011	12.0	1	1	386	1.62	0	Assumed 1 turnover per month
41120	H-1	IFR	JP-8	200,000	69,190	130	0.011	1	1	0.011	0.3	1	1	386	4.32	(all losses)	Tanker truck to storage tank. Tank to tanker truck, tanker truck to helicopters (100%)
41121	H-2	IFR	JP-8	200,000	69,190	130	0.011	1	1	0.011	0.3	1	1	386	4.32	(all losses)	Tanker truck to storage tank. Tank to tanker truck, tanker truck to helicopters (100%)
														TOTAL VOC FROM JP-8 TANK WORKING AND BREATHING LOSSES, LBS	10.26		

SECTION 11

FUEL TRANSFER

Source Description

As discussed in Section 14 of the AEI Guidance Document, fuel transfer procedures include loading of fuel into tanker trucks, vehicles, and equipment. At Malmstrom AFB JP-8 and diesel fuel are delivered to the site via tanker truck. To avoid double counting of emissions resulting from tank working losses, emissions from the delivery of fuel into storage tanks are covered in Section 10, Fuel Storage. This source accounts for fuel transfers which occur after delivery: from the storage tanks into tanker trucks, subsequent transfer of fuel into equipment and tanks, and dispensing of fuel from on-site tanks.

Two types of fuel methods were reported, splash and submerged loading. The primary method of loading used at Malmstrom is bottom loading, a form of submerged loading. Vapor recovery systems were not present. The applicable two-digit SIC code for this operation is 97 for National Security and International Affairs. Applicable SCC codes are included within 4-06-001, Transportation and Marketing of Petroleum Products, Tank Cars and Trucks. Specific applicable SCC codes include:

- Distillate Oil: Submerged Loading (Normal Service), 4-06-001-35 (for diesel bottom-loaded, submerged transfer)
- Jet Naphtha: Submerged Loading (Normal Service), 4-06-001-33 (for JP-8 bottom-loaded, submerged transfer)
- Distillate Oil: Splash Loading (Normal Service), 4-06-001-40 (for diesel splash transfer)
- Jet Naphtha: Splash Loading (Normal Service), 4-06-001-38 (for JP-8 splash transfer)

Actual Emissions

To calculate VOC emissions from fuel transfer operations, the amount of fuel transferred (FT) was obtained from Mr. Mike Foran, Fuels Control. In addition, a loading loss (LL) for each fuel transfer operation was calculated by multiplying a saturation factor, S (based on the method of fuel loading), by the vapor pressure (P) and molecular weight (M) of the fuel, then dividing by the mean annual temperature for Great Falls, Montana in degrees Rankine. This number was multiplied by a constant and the amount of vapors captured by vapor recovery system (CAPeff, CONeff) were subtracted (for Malmstrom AFB this number is 0), as follows.

$$LL = 12.46 * [(S*P*M)/T] * [1-(CAPeff/100 * CONeff/100)]$$

This LL was then substituted into the following equation to obtain total VOC emissions:

$$Evoc = FT * LL$$

Once calculated, VOC emissions were multiplied by the weight percentage of HAPs in vapor-phase speciation (VWPhap), to obtain individual HAP emissions.

$$Ehap = Evoc * (VWPhap/100)$$

The attached calculation sheet details specific calculations performed for each fuel transfer operation.

Potential Emissions

Potential emissions were calculated based on the ratio of the potential number of operating hours (8,760 hours) to the actual number of operating hours in 1999 (2,080 hours). This results in a ratio of 4.2. Potential emissions were estimated by multiplying the actual emissions for VOCs and HAPs by 4.2.

References

1. U.S. Environmental Protection Agency, Compilation of Air Pollutant Emission Factors – Volume I: Stationary Point and Area Sources (AP-42), Section 5.2, January 1995.

2. U.S. Environmental Protection Agency, Compilation of Air Pollutant Emission Factors – Volume I: Stationary Point and Area Sources (AP-42), Section 7.1, February 1996.

3. American Petroleum Institute, Manual of Petroleum Measurements Standards: Chapter 19.4 – Recommended Practice for Speciation of Evaporative Losses, First Edition, November 1997.

4. U.S. Environmental Protection Agency, Technical Support Document for Development of a Comparable Fuel Exemption, Draft Version, February 1996.

5. U.S. Air Force Bioenvironmental Engineering Division, Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations, Brooks Air Force Base, TX 78235-5114, May 1999.

Client:	Malmstrom AFB	**Date:**	10/9/00
Location:	Base-wide	**Emissions:**	Actual and Potential
Subject:	Fuel transfer of JP-8 and Diesel	**Calc. by:**	*DDM*

Objective: Calculate emissions associated with fuel transfer operations (excluding automobile and tank transfers).

Variables:

1) VOC emissions from the transfer of fuel into an HELICOPTERS, tanker truck or bowser (lb/yr) =	**Evoc**
2) Quantity of fuel transferred to the aircraft, tanker truck or bowser during year (10^3 gal/yr) =	**FT**
3) Loading loss associated with the aircraft, tanker or bowser (lb/10^3 gal) =	**LL**
4) Saturation factor =	**S**
5) True vapor pressure of liquid loaded (psia) =	**P**
6) Molecular weight of vapors (lb/lb-mole) =	**M**
7) Temperature of bulk liquid loaded =	**T**
8) Capture efficiency of vapor control system (%) =	**CAPeff**
9) Control efficiency of vapor recovery unit (%) =	**CONeff**
10) Scaleup factor equal to 4.2 for potential emissions	

Step 1: Calculate total VOC emissions associated with fuel loading :

LL = 12.46 * [(S*P*M)/T]*[1-(CAPeff/100*CONeff/100)]
Evoc = FT*LL

Transfer Operation	S	P	M	T	CAPeff	CONeff	LL	FT (10^3 gal/yr)	Evoc (lb/yr)
JP-8:									
From tanker truck into storage tanks	Working losses estimated in storage tank calculations								see Tanks
From storage tank into tanker trucks	0.6	0.011	130	528	0	0	0.02	138	2.8
From tanker truck into helicopters	0.6	0.011	130	528	0	0	0.02	138	2.8
Product recovery tank - 1480, 400 gal UST	Working losses estimated in storage tank calculations								see Tanks
Diesel (Tank D1):									
From tanker truck into D-1 storage tank	Working losses estimated in storage tank calculations								see Tanks
From D-1 storage tank into tanker truck	0.6	0.009	130	528	0	0	0.02	40.00	0.66
From tanker truck into storage tanks	Working losses estimated in storage tank calculations								see Tanks
From storage tank into equipment (Red Horse)	1.45	0.009	130	528	0	0	0.04	5.00	0.20
Diesel (MSS 10,000 gal tanks):									
From tanker truck into 2-10,000 gal tks	Working losses estimated in storage tank calculations								see Tanks
From storage tanks into vehicles	0.6	0.009	130	528	0	0	0.02	72.18	1.20
From storage tank into equipment	1.45	0.009	130	528	0	0	0.04	72.18	2.89
From tanker truck into small tanks	No fuel is transferred to other tanks from MSS diesel tanks.								see Tanks
								Total (lb/yr):	**10.55**
								Total (ton/yr):	**0.005**

Client: Malmstrom AFB
Location: Base-wide
Subject: Fuel transfer of JP-8 and Diesel

Date: 10/9/00
Emissions: Actual and Potential
Calc. by: *DDM*

Step 2: Calculate emissions of specific HAP constituents using equation $E_{HAP} = E_{VOC} * (\%HAP/100)$:

10) Emissions of a HAP constituent in the fuel (lb/yr) = Ehap
11) Weight percentage of the HAP Constituent in the fuel vapor = %HAP

	%HAP[a]							
	Benzene	Cumene	Ethylbenzene	Naphthalene	Toluene	2,2,4 - Trimethyl pentane	Xylenes	Hexane (n-hexane)
Vapor-Phase Speciation of JP-8	0.613	0.330	0.271	0.003	1.143	0.010	1.877	0
Vapor-Phase Speciation of Diesel	7.200	0.400	0.700	0	4.100	0	2.500	2.300

		E_{HAP} (lb/yr)							
	E_{voc} (lb/yr)	Benzene	Cumene	Ethylbenzene	Naphthalene	Toluene	2,2,4 - Trimethylpentane	Xylenes	Hexane (n-hexane)
JP-8:									
From storage tank into tanker trucks	2.80	1.72E-02	9.25E-03	7.59E-03	8.41E-05	3.20E-02	2.80E-04	5.26E-02	0
From tanker truck into helicopters	2.80	1.72E-02	9.25E-03	7.59E-03	8.41E-05	3.20E-02	2.80E-04	5.26E-02	0
Diesel (Tank D1):									
From D-1 storage tank into tanker truck	0.66	4.77E-02	2.65E-03	4.64E-03	0	2.72E-02	0	1.66E-02	1.52E-02
From storage tank into equipment (Red Horse)	0.20	1.44E-02	8.01E-04	1.40E-03	0	8.21E-03	0	5.00E-03	4.60E-03
Diesel (MSS 10,000 gal tanks):									
From storage tanks into vehicles	1.20	8.61E-02	4.78E-03	8.37E-03	0	4.90E-02	0	2.99E-02	2.75E-02
From storage tank into equipment	2.89	2.08E-01	1.16E-02	2.02E-02	0	1.18E-01	0	7.22E-02	6.65E-02
Total Actual (lb/yr):	**10.55**	**0.39**	**0.04**	**0.05**	**0.0002**	**0.27**	**0.001**	**0.23**	**0.11**
Total Potential (lb/yr):	**14.03**	**0.52**	**0.05**	**0.07**	**0.0002**	**0.36**	**0.001**	**0.30**	**0.48**
Total Actual (ton/yr):	**5.28E-03**	**1.95E-04**	**1.91E-05**	**2.49E-05**	**8.41E-08**	**1.33E-04**	**2.80E-07**	**1.14E-04**	**5.69E-05**
Total Potential (ton/yr):	**7.02E-03**	**2.60E-04**	**2.55E-05**	**3.31E-05**	**1.12E-07**	**1.78E-04**	**3.73E-07**	**1.52E-04**	**2.39E-04**

(a) AEI Guidance Document, "Table 13-2. Liquid-phase and Vapor-phase Speciation of JP-8."

SECTION 12

GASOLINE SERVICE STATIONS

Source Description

Gasoline service stations at Malmstrom Air Force Base include the military service station (Building 430), and the BX (commercial) gasoline station (Building 685). Tanker trucks deliver gasoline to one-10,000 gallon AST at Building 430 and to three-10,000 USTs at Building 685. Emissions from gasoline service stations include VOCs and organic HAPs. Four types of emissions are identified by the AEI Guidance Document: emissions originating from filling of the storage tanks (these calculations were completed under Fuels Storage and will not be further discussed in this source description), breathing and emptying losses from the storage tanks (these calculations were completed under Fuels Storage, Section 10, and will not be further discussed in this source description), vehicle refueling operations, and spills associated with vehicle refueling operations.

Applicable two-digit SIC Codes include: 97 for National Security and International Affairs and, to a lesser degree, 55 for Automotive Dealers and Gasoline Service Stations. Applicable SCC Codes include 4-06-004-01 (Transportation and Marketing of Petroleum Products, Filling Vehicle Gas Tanks – Stage II, Vapor Loss without Controls) and 4-06-004-02 (Transportation and Marketing of Petroleum Products, Filling Vehicle Gas Tanks – Stage II, Liquid Spill Loss without Controls). Note that Tank filling operations and breathing and emptying losses were included in SCC codes listed in Section 10 of this report. Stage I Vapor Control present at the BX gasoline station are reflected in Section 10 calculations completed for tank filling at that location.

Actual Emissions

Emissions were calculated as discussed in Section 15 of the AEI Guidance Document. VOC emissions were estimated by calculating emissions associated with each type of loss (vehicle refueling and spills), then summing. The emissions from each source type were calculated by multiplying gasoline throughput (GT) by an appropriate emission factor. Gasoline throughputs were reported by the supplier for each tank; emission factors were taken from Table 15-1 of the AEI Guidance Document based on Stage II Emission Controls (present at both the BX and Military Gas Stations). Total VOCs were then calculated as follows for each gasoline service area:

$$\text{Evoc-total} = [\text{GT}*\text{EFvoc-vd}] + [\text{GT} * \text{EFvoc-s}]$$

Once total VOCs were calculated, the estimate was multiplied by the weight percentage of HAPs present from vapor-phase speciation of gasoline (Table 15-2 of the AEI Guidance Document).

Detailed calculation method is outlined in the attached spreadsheet.

Potential Emissions

Potential emissions were calculated based on the ratio of the potential number of operating hours (8,760 hours) to the actual number of operating hours in 1999 (2,080 hours). This results in a ratio of 4.2. Potential emissions were estimated by multiplying the actual emissions for VOCs and HAPs by 4.2.

References

1. U.S. Environmental Protection Agency, Compilation of Air Pollutant Emission Factors – Volume I: Stationary Point and Area Sources (AP-42), Section 5.2, January 1995.

2. U.S. Environmental Protection Agency, Compilation of Air Pollutant Emission Factors – Volume I: Stationary Point and Area Sources (AP-42), Section 7.1, February 1996.

3. American Petroleum Institute, Manual of Petroleum Measurements Standards: Chapter 19.4 – Recommended Practice for Speciation of Evaporative Losses, First Edition, November 1997.

4. U.S. Environmental Protection Agency, Technical Support Document for Development of a Comparable Fuel Exemption, Draft Version, February 1996.

5. U.S. Environmental Protection Agency, TANKS Program (Storage Tank Emissions Calculation Software), Version 4.0, December 1999.

6. Emissions Inventory Improvement Program (EIIP), Volume III, Chapter 11, "Gasoline Marketing (Stage I and Stage II)," September 1997.

7. U.S. Air Force Bioenvironmental Engineering Division, Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations, Brooks Air Force Base, TX 78235-5114, May 1999.

Client: Malmstrom AFB
Location: Base-wide
Subject: Gasoline fuel transfer

Date: 12/07/2000
Emissions: Actual and Potential
Calc. by: *DDM*

Objective: Calculate emissions associated with fuel transfer operations of gasoline.

Variables:

1) Total VOC emissions from a gasoline service station (lb/yr) = $E_{voc\text{-}total}$
2) VOC emissions associated with filling of the tanks (lb/yr) **[NOTE: fill losses included under TANKS, Section 10]** $E_{voc\text{-}fill} = 0$
3) VOC emissions associated with breathing and emptying losses from the tanks (lb/yr) **[NOTE: breathing losses covered under TANKS, Section 10]** $E_{voc\text{-}b\&e} = 0$
4) VOC emissions associated with vapor displacement from automobile tanks during refueling (lb/yr) **(Emission factor reflects BX Station and Mil Station Stage II controls).** $E_{voc\text{-}vd}$
5) VOC emissions associated with spillage during automobile refueling (lb/yr) $E_{voc\text{-}s}$
6) Gasoline throughput in thousands of gallons per year (1000 gal/yr) **GT**
7) VOC emission factors in pounds per thousands of gallons fuel (lb/1000 gal) $EF_{voc\text{-}fill}$, $EF_{voc\text{-}b\&e}$, $EF_{voc\text{-}vd}$, $EF_{voc\text{-}s}$

Step 1: Calculate total VOC emissions associated with gasoline transfers:

$$E_{voc\text{-}total} = E_{voc\text{-}fill} + E_{voc\text{-}b\&e} + E_{voc\text{-}vd} + E_{voc\text{-}s}$$
$$E_{voc\text{-}total} = 0 + 0 + [GT*EF_{voc\text{-}vd}] + [GT*EF_{voc\text{-}s}]$$

GasolineTransfer Location	GT (1000 gal/yr)	$EF_{voc\text{-}fill}$ (a)	$EF_{voc\text{-}b\&e}$ (a)	$EF_{voc\text{-}vd}$ (b)	$EF_{voc\text{-}s}$ (b)	Actual $E_{voc\text{-}total}$	Potential $E_{voc\text{-}total}$ (c)
Military service station (B430)	149.90	-	-	1.1	0.7	**269.81**	**1133.22**
BX Gas Station (B685)	672.59	-	-	1.1	0.7	**1210.67**	**5084.80**
					Total VOC (lb/yr):	**1480.48**	**6218.02**
					Total VOC (ton/yr):	**0.74**	**3.11**

(a) Emission Factors not shown for filling, breathing and evaporative losses because the TANKS program was utilized to calculate emissions.
(b) AGI Table 15-1. Emission Factors Shown in lb/1000 gal.
(c) Actual emissions were multiplied by a factor of 4.2 to obtain potential emissions. 4.2 is the ratio of maximum operating hours to actual (8760/2080)

Client:	Malmstrom AFB	**Date:**	12/07/2000
Location:	Base-wide	**Emissions:**	Actual and Potential
Subject:	Gasoline fuel transfer	**Calc. by:**	*DDM*

Step 2: Calculate emissions of specific HAP constituents using equation $E_{HAP} = E_{VOC} * (\%HAP/100)$, where:

8) Emissions of a HAP constituent in the fuel (lb/yr) = **Ehap**
9) Weight percentage of the HAP Constituent in the fuel vapor = **%HAP**

	%HAP[d]							
	Benzene	**Cumene**	**Ethylbenzene**	**Mert tert-butyl ether**	**Toluene**	**2,2,4 - Trimethylpentane**	**Xylenes**	**Hexane (n-hexane)**
Vapor-Phase Speciation of Gasoline	0.600	0.020	0.040	4.600	0.700	0.700	0.200	0.500

(d) AEI Guidance Document, "Table 15-2. Liquid-phase and Vapor-phase HAP Speciation of Gasoline."

		Actual E_{HAP} (lb/yr)							
Location	**E_{voc} (lb/yr)**	**Benzene**	**Cumene**	**Ethylbenzene**	**Mert tert-butyl ether**	**Toluene**	**2,2,4 - Trimethylpentane**	**Xylenes**	**Hexane (n-hexane)**
Military service station (B430)	269.81	1.62E+00	5.40E-02	1.08E-01	1.24E+01	1.89E+00	1.89E+00	5.40E-01	1.35E+00
BX Gas Station (B685)	1210.67	7.26E+00	2.42E-01	4.84E-01	5.57E+01	8.47E+00	8.47E+00	2.42E+00	6.05E+00
Totals (lb/yr):	**1480.48**	**8.88**	**0.30**	**0.59**	**68.10**	**10.36**	**10.36**	**2.96**	**7.40**
Totals (ton/yr):	**0.74**	**0.004**	**0.000**	**0.000**	**0.034**	**0.005**	**0.005**	**0.001**	**0.004**

		Potential E_{HAP} (lb/yr)[c]							
Location	**E_{voc} (lb/yr)**	**Benzene**	**Cumene**	**Ethylbenzene**	**Mert tert-butyl ether**	**Toluene**	**2,2,4 - Trimethylpentane**	**Xylenes**	**Hexane (n-hexane)**
Military service station (B430)	1133.22	6.80E+00	2.27E-01	4.53E-01	5.21E+01	7.93E+00	7.93E+00	2.27E+00	5.67E+00
BX Gas Station (B685)	5084.80	3.05E+01	1.02E+00	2.03E+00	2.34E+02	3.56E+01	3.56E+01	1.02E+01	2.54E+01
Totals (lb/yr):	**6218.02**	**37.31**	**1.24**	**2.49**	**286.03**	**43.53**	**43.53**	**12.44**	**31.09**
Totals (ton/yr):	**3.11**	**0.019**	**6.22E-04**	**0.001**	**0.143**	**0.022**	**0.022**	**0.006**	**0.016**

(c) Actual emissions were multiplied by a factor of 4.2 to obtain potential emissions. 4.2 is the ratio of maximum operating hours to actual (8760/2080)

SECTION 13

HEAVY CONSTRUCTION OPERATIONS

Source Description

Heavy construction operations at Malmstrom Air Force Base include construction of roadways, site-preparation for the construction of new buildings and demolition of existing buildings or structures. Emissions considered in this source category are fugitive dust created by the demolition and earth moving phases of the aforementioned activities. Heavy Construction Operations are included in the two-digit SIC Code 16 for Heavy Construction Other than Building Construction Contractors. The SCC for these operations includes construction; building contractors 3-11-001-01, 3-11-001-02, 3-11-001-03; and demolition/special trade contractors 3-11-002-03, 3-11-002-04, 3-11-002-05, 3-11-002-06.

Actual Emissions

Actual emissions were considered for dust-generating construction activities that occurred in calendar year 1999. Emissions were estimated by calculating the acreage of each site that was prepared or demolished daily, the emission factor (80 pounds of particulate matter per acre per day), and the number of full 8-hour days for which these operations occurred. PM10 emissions were assumed to be 45% of total particulate emissions based on the AEI Guidance Document.

MAFB was able to provide a list of construction sites that were active in 1999. A site map drawn to scale was obtained to determine the area of each site that was constructed or demolished during the year.

Four construction projects were performed in 1999:

- Construction activities were performed at the building 1060 site. The site was approximately 50' x 200' and activities were completed in one week.

- The land bounded by 57th Street, 67th Street, 10th Avenue, and the Burlington Northern Railroad was being developed in 1999. Construction was underway on 75% of this land which is estimated to be 44 acres. It was estimated that 20 days was spent on site, and that an average of 10% of the total site was disturbed per day.

- A water line along the perimeter road was installed. This is one foot wide by 7,920 feet. Thirty days was spent working on this site.

- Red Horse field training area was developed. This area is 20' x 20' and took 10 days to develop.

Potential Emissions

Activity in calendar year 1999 was heavy with the development north of 10th Avenue. Future operations may increase but may also decrease depending on future budget approval. Therefore, potential emissions are estimated to be equal to actual emissions.

References

1. U.S. Environmental Protection Agency, Compilation of Air Pollutant Emission Factors – Volume I: Stationary Point and Area Sources (AP-42), Section 13.2.3, September 1995.

2. Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations, Section 16, May 1999.

Client: Malmstrom AFB
Location: Basewide
Subject: Heavy Construction Operations

Date: 10/27/2000
Emissions: Actual and Potential
Calc by: *SBH*

Parameter	**Value**		**Basis**
PM emission factor	80	lb/acre-day	AEI Guidance Document
Portion of particulate matter <10μm	45%	%	AEI Guidance Document

Calculation

$E_{PM} = EF \times D \times A$

E_{PM} = Emissions of total suspended particulate (lb/yr)

EF = Emission factor (80 lb/acre-day)

D = Estimated number of full working days in which construction activities are performed (days/yr)

A = Average area of property in which daily construction projects are typically performed (acres)

E_{PM10} = Emissions of PM10 (lb/yr)

$E_{PM10} = E_{PM} \times F$

F = Portion of particulate matter <10mm

Potential emissions are assumed to be the same as actual.

Emissions

Site Description	Dimensions	Total Area of Construction (ft^2)	Total Construction Area (acres)	Number of Working Days (**D**)	Approxiate Percent of Total Construction Area Disturbed *Daily* (%)	Average Area of *Daily* Construction (acres) (**A**)	PM Emissions (lb/yr)	PM10 Emissions (lb/yr)	PM Emissions (tpy)	PM10 Emissions (tpy)
Building 1060	50' x 200'	10,000	0.23	7	100	0.23	129	58	0.064	0.03
Area Bounded by 57th Street, 67th Street, 10th Avenue North, and Burlington Northern Railroad - Only 75% of area	75% of 800' x 3200'	1,920,000	44.08	20	10	4.41	7,052	3,174	3.526	1.59
Red Horse - Water Line, Perimeter Road	1' x 7920'	7,920	0.18	30	100	0.18	436	196	0.218	0.10
Red Horse - Field Training Area	20' x 20'	400	0.01	10	100	0.01	7	3	0.004	0.00
				Total Emissions:			**7,625**	**3,431**	**3.8**	**1.7**

SECTION 14

LANDFARM OPERATIONS

Source Description

Currently the MAFB has 3.3 acre site used to landfarm soil contaminated with gasoline and diesel fuel. Emissions considered in this source category are VOC and HAPs. Landfarms are included in the two-digit SIC Code 49 Electric, Gas, and Stationary Services. The most representative SCC Code for these operations is Solid Waste Disposal, Industrial, TSDF, Landfill Treatment Fugitive Emissions – 5-03-008-20.

Actual Emissions

Actual emissions were calculated using U.S. EPA's CHEMDAT8 Model. The segment of the model used was for land treatment of wastes. It was assumed that one half of the area was covered with diesel fuel contaminated soil. Although clean soil is removed from the landfarm and contaminated soil is put in its place, it was assumed that the entire area was covered with contaminated soil at the beginning of the year and left there all year. The oil concentration of the soil at the beginning of the year was assumed to be equal to the highest values for gasoline and diesel fuel in the analytical data provided by MAFB. Total VOC emissions for this source are 3.5 tpy.

Potential Emissions

Based on the AEI Guidance Document for landfill, emissions, potential emissions equals actual emissions.

References

1. Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations, Section 19, May 1999.

2. CHEMDAT8 Model, U.S. Environmental Protection Agency, EPA-453/C-94-08 OB November 1994.

Client:	Malmstrom AFB	**Date:**	8/28/2000
Location:	Malmstrom AFB	**Emissions:**	Actual and Potential
Subject:	Landfarm	**Calc by:**	*SBH*

Emissions calculated using US EPAs CHEMDAT8 Model

Assumptions: The landfarm is in constant flux, as the contaminated soil is made clean, more soil is added in its place. Emissions are estimated assuming that the entire area was covered with soil at the beginning of the year, and the soil remained there throughout the year.

It is assumed that one half of the soil is contaminated with diesel fuel and one half with gasoline.

Potential Emissions = Actual Emissions based on AEI Guidance for landfills

Parameters entered into the CHEMDAT8 Model:

Parameter	**Value**		**Basis**
	Diesel	Gasoline	
L, Loading (g oil/cc soil)	*0.0006*	*0.0018*	*=Loading (mg/Kg) x Density of soil (g/cm3) /1e6*
L, Loading (mg/Kg)	368	1210	Average value given in analytical samples
Density of soil (g/cm3)	1.5	1.5	Assumed
Concentration in oil (ppmw)	*1.00E+06*	*1.00E+06*	*The contaminant is 100% oil*
T (^{o}K)	*298*	*298*	*Ambient Conditions*
Wind Speed (m/s)	*5.5*	*5.5*	*National Weather Service*
Area (m2)	*6677*	*6677*	*One half of 3.3 acres for each gasoline and diesel fuel contaminated soils*
Molecular Weight of Oil	*185*	*94*	*AEI Guidance Manual*

Results from CHEMDAT8

VOC emissions (Mg/m2-yr)	1.20E-04	3.57E-04	CHEMDAT8 Results

Client:	Malmstrom AFB	**Date:**	8/28/2000
Location:	Malmstrom AFB	**Emissions:**	Actual and Potential
Subject:	Landfarm	**Calc by:**	*SBH*

Potential VOC emissions = Actual Emissions
=emissions (Mg/M2-yr) x area (m2) x1e6 /454 lb/Mg /2000 lb/ton

	Diesel Fuel	Gasoline	Total
VOC emissions (tons/yr)	0.88	2.63	**3.51**

HAP Emissions

	Weight Percent in Vapor Phase (AEI Guidance Manual)	
HAP Component	**Diesel Fuel**	**Gasoline**
Benzene	7.2	0.6
Cumene	0.4	0.02
Ethylbenzene	0.7	0.04
n-Hexane	2.3	0.5
Naphthalene	0	0
Toluene	4.1	0.7
Xylenes (mixedisomers)	2.5	0.2
2,2,4-Tri-methylpentane	-	0.7
Methyl tert-butyl ether	-	4.6

	Actual and Potential Emissions (tons/year)		
	Diesel Fuel	**Gasoline**	**Total**
Benzene	0.06	0.02	0.08
Cumene	0.00	0.001	0.00
Ethylbenzene	0.01	0.00	0.01
n-Hexane	0.02	0.01	0.03
Naphthalene	0	0	0.0
Toluene	0.04	0.02	0.05
Xylenes (mixedisomers)	0.02	0.01	0.03
2,2,4-Tri-methylpentane	-	0.02	0.02
Methyl tert-butyl ether	-	0.12	0.12

SECTION 15

MISCELLANEOUS CHEMICAL USAGE

Source Description

Miscellaneous chemicals are those materials that are used throughout the facility that are not accounted for in any other processes' emission calculations. These materials may be used as cleaners, spray coatings, adhesives, sealants and laboratory chemicals. Emissions from these miscellaneous products include volatile organic compounds (VOC) and hazardous air pollutants (HAPs). They are included in the two-digit SIC Code 97 for National Security and International Affairs. The SCC that best describes this emission category is petroleum and solvent evaporation, fugitive emissions 4-01-888-98.

Actual Emissions

Actual VOC emissions were estimated using a mass balance approach. Mr. Don Delorme in the HAZMART provided EQ with an EMIS report that detailed material issued on a per-shop basis. It was estimated that all material that was issued to a shop in 1999 was used in 1999, with the exception of chemicals reported for Building 3080, or to organization 341st LSS LGLOM 230 HP. It was reported by Mr. Pat Merrill of this organization that 99% of paints assigned to this shop, and 95% of other products assigned to the shop, are utilized at remote locations to service the missile facilities. Therefore, the issued quantities were reduced to 1% and 5% usage, respectively, on MAFB.

In addition to shop usage, the chemical composition for each of the materials was detailed in the EMIS report. Mr. Delorme added additional information to the database from a separate material safety data sheet (MSDS) database, including VOC content and specific gravity information. It was assumed that all VOC content information was reported in percent by weight. Where specific gravity and/or VOC content were not available, the properties from a similar product were substituted. The chemical composition was reviewed to assess how much of the material was lost to the air during use. If no information was given for disposal quantity to the air, it was estimated that 100% was lost to the air during use for VOC content products with high vapor pressures (i.e., adhesives and paints) and 5% was lost to the air during use for low vapor pressure VOC containing- products (i.e., anti-freeze). Motor oils and greases were eliminated from the VOC emissions analysis first due to the extremely low vapor pressure of the components, and second due to the observed storage of these materials in closed containers, and/or small tanks (approximately 100 gallon).

In addition to the overall EMIS database, Mr. Delorme provided EQ with an organic and inorganic HAP database for calendar year 1999. The HAP report is also based on issuance to shops. Reported HAP-containing products for organization LSS LGLMO 230 HP were reduced

as described above. In addition, products consisting largely of VOC were reduced by an appropriate percentage emitted to air, as described above.

These databases appeared, in some cases, to be dated and inconsistent. However, Mr. Delorme indicated that these records represent the best information available until the newly installed EMIS system is fully populated with the chemical composition of each material.

Potential Emissions

Potential emissions for miscellaneous chemical usage were calculated by multiplying actual emissions by the potential hours of operation each year (8,760) divided by the actual operating hours for 1999 (2,080).

Reference

1. Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations, Section 20, May 1999.

2. 1997 Air Emissions Inventory for Langley Air Force Base, Environmental Quality Management Project No. 3414-017-050/October 1998

Client: Malmstrom AFB
Location: Base-wide
Subject: Miscellaneous Chemical Usage

Date: 09/06/2000
Emissions: 1999 Actual
Calc by: *NM/TLW*

Parameter	**Basis**
1. Miscellaneous Chemicals include Laboratory chemicals and general solvent chemicals used at Malmstrom AFB	EMIS Database
2. Emissions are determined based on material balance.	AEI Guidance Document
3. Chemical compositions are from EMIS reports	HAZMART, Mr. Don Delorme

Material	1999 lbs	VOC, lbs		VOC, tons	
		Actual	Potential	Actual	Potential
Adhesives	1,651.36	169.18	710.57	0.08	0.36
Antifreeze	5,352.94	266.50	1,119.31	0.13	0.56
Cleaner/Solvents	3,453.54	148.22	622.49	0.07	0.31
Degreasers	1,277.11	214.00	898.81	0.11	0.45
Fuel Additives	114.77	38.98	163.70	0.02	0.08
Lab	139.85	73.41	308.33	0.04	0.15
Misc	1,750.39	617.53	2,594.60	0.31	1.30
Paints/Thinners	5,706.01	2,971.87	12,481.83	1.49	6.24
Sealants	1,250.70	327.04	1,373.56	0.16	0.69
Totals:		**4,826.73**	**20,273.20**	**2.41**	**10.14**

Client: Malmstrom AFB
Location: Base-wide
Subject: Miscellaneous Chemical Usage

Date: 09/06/2000
Emissions: 1999 Actual
Calc by: *NM/TLW*

Parameter

1. Miscellaneous Chemicals include Laboratory chemicals and general solvent chemicals used at Malmstrom AFB
2. Emissions are determined based on material balance.
3. Chemical compositions are from 2761 reports, EMIS database, and MSDS database provided by Mr. Don Delorme, HAZMART.

										Actual		Potential	
USAGE	Chemical Name	NSN Number	1999 Quantity	Units	SG	Density lbs. / unit	1999 Pounds	Percent to Air	VOC%	LBS	TNS	LBS	TNS
A	Adhesive Sealant	803000D020036	40	OZ	0.869	7.26	2.17	100	45	0.98	0.0005	4.116	0.0021
A	3M Adhesive	803000N035086	196	OZ			12.25	100	10	1.23	0.0006	5.166	0.0026
A	Threadlocker 626 Adhesive	8030011594374	2.04	OZ	1.06	8.85	0.14	100	100	0.14	7E-05	0.588	0.0003
A	Rocker Schutz (3M)	8030012327693	69	QT	0.81	6.76	116.6	100	5	5.83	0.0029	24.486	0.0122
A	209 Adhesive Sealant	8030P290	40	OZ	1.069	8.93	2.68	100	95	2.55	0.0013	10.71	0.0054
A	Loctite Adhesive	8030P98D	96	OZ	0.869	7.26	5.22	100	35	1.83	0.0009	7.686	0.0038
A	Adhesive Resin	8040000922816	352.19	GR	1.2	10.02	0.936	100	100	0.936	0.0005	3.9312	0.002
A	RH Carlson Adhesive	8040000976524	2	QT	0.98	8.18	4.087	100	45	1.84	0.0009	7.728	0.0039
A	Super-Glue	8040001429193-1	1.5	OZ			0.9	100	100	0.9	0.0005	3.78	0.0019
A	Rubber to Metal Adhesive	8040001658614	65.6	OZ	0.81	6.76	3.32	100	84.1	2.79	0.0014	11.718	0.0059
A	Rubber to Metal Adhesive	8040002738717	2.4	OZ	0.81	6.76	0.12	100	84.1	0.1	5E-05	0.42	0.0002
A	Non Advantage Adhesive	8040002904301	4.8	OZ	0.88	7.35	0.26	100	73.6	0.19	1E-04	0.798	0.0004
A	Epoxy Kit	8040005397798	1.2	OZ	1.16	9.69	0.09	100	10	0.009	5E-06	0.0378	2E-05
A	PVC Adhesive	8040005731502	352	OZ	0.901	7.52	19.82	100	70	13.87	0.0069	58.254	0.0291
A	Solventborne Adhesive	8040006644318	4	OZ	0.88	7.35	0.22	100	73.6	0.16	8E-05	0.672	0.0003
A	R-373 Adhesive	8040008419773	35.2	OZ	0.8	6.68	1.76	100	50	0.88	0.0004	3.696	0.0018
A	LHB Adhesive	8040009386860	168	OZ	0.89	7.43	9.35	100	90	8.42	0.0042	35.364	0.0177
A	Rear View Mirror Adhesive Activator	804000F028094	0.4	OZ	1.301	10.86	0.0325	100	95	0.031	2E-05	0.1302	7E-05
A	Belzona Adhesive Kit	804000F051852	60	KT	1.21	10.1	72.6	100	15	10.89	0.0054	45.738	0.0229
A	Loctite Adhesive	804000N034937	4	KT			4	100	95	3.8	0.0019	15.96	0.008
A	PVC Clear Cement	804000N045395	80	OZ	0.94	7.85	4.7	100	97	4.56	0.0023	19.152	0.0096
A	Floor Adhesive Compound	804000N071772	2	LB	1.501	12.53	3.002	100	50	1.5	0.0008	6.3	0.0032
A	Epoxy Adhesive Kit	804000N078814	3	EA	1.16	9.69	0.261	100	50	0.13	7E-05	0.546	0.0003
A	TPA - 150 Adhesive	8040011479957	65	GR	1.331	11.11	0.19	100	50	0.095	5E-05	0.399	0.0002
A	Macco LN-601 Adhesive	8040013288043	1990	OZ	1.05	8.77	130.6	100	56.03	73.18	0.0366	307.36	0.1537
A	Weatherstrip Gasket Adhesive	8040P08011	25	OZ			1.56	100	100	1.56	0.0008	6.552	0.0033
A	3M Adhesive	8040P08090	8	CN		6.35	8	100	100	8	0.004	33.6	0.0168
A	3M Adhesive	8040P08101	2	OZ	1.35	11.27	0.169	100	70	0.12	6E-05	0.504	0.0003
A	Channel Bonding	8040P08641	1	TU	1.18	9.85	1.18	100	20	0.236	0.0001	0.9912	0.0005
A	Thread Locker Adhesive	8040P24200	0.4	OZ			0.025	100	90	0.023	1E-05	0.0966	5E-05
A	Loctite Adhesive	8040P3346	0.8	OZ	1.301	10.86	0.065	100	97	0.063	3E-05	0.2646	0.0001
A	Super-Glue	8040P92009	17	OZ	1.06	8.85	1.124	100	95	1.07	0.0005	4.494	0.0022
A	Wallboard Adhesive	8040PAA008U	388.5	OZ			24.28	100	50	12.14	0.0061	50.988	0.0255
A	Cove Base Adhesive	8040PCB-10	672	OZ	1.43	11.94	60.06	100	0.21	0.13	7E-05	0.546	0.0003
A	Macco LN-601 Adhesive	80470013288043	210	OZ	1.05	8.77	13.78	100	56.03	7.77	0.0039	32.634	0.0163
A	Epoxy Adhesive	561000N057015	800	GM	0.98	8.18	1.76	100	70	1.23	0.0006	5.166	0.0026
AF	55 Gal Ethylene Glycol	6810000064206	11	GL	1.09	9.1	100.06	5	100	5.003	0.0025	21.013	0.0105
AF	Propylene Glycol Antifreeze	6810003943555	55	GL	1.04	8.68	459	5	100	22.95	0.0115	96.39	0.0482
AF	55 Gal. Antifreeze	6850001817940	165	GL	1.12	9.35	1542	5	95	73.25	0.0366	307.65	0.1538
AF	Antifreeze (Sierra)	685000N050648	10	QT			20.86	5	95	0.99	0.0005	4.158	0.0021

Client: Malmstrom AFB
Location: Base-wide
Subject: Miscellaneous Chemical Usage

Date: 09/06/2000
Emissions: 1999 Actual
Calc by: *NM/TLW*

Parameter
1. Miscellaneous Chemicals include Laboratory chemicals and general solvent chemicals used at Malmstrom AFB
2. Emissions are determined based on material balance.
3. Chemical compositions are from 2761 reports, EMIS database, and MSDS database provided by Mr. Don Delorme, HAZMART.

										Actual		Potential	
USAGE	Chemical Name	NSN Number	1999 Quantity	Units	SG	Density lbs. / unit	1999 Pounds	Percent to Air	VOC%	LBS	TNS	LBS	TNS
AF	Old World Antifreeze	6850014413218	256	OZ	1.12	9.35	17.92	25	95	4.26	0.0021	17.892	0.0089
AF	55 Gal. Antifreeze	6850014413223	330	GL	1.12	9.35	3084.5	5	100	154.23	0.0771	647.77	0.3239
AF	Dex-Cool Antifreeze	6850P07994	13	GL	1.131	9.44	122.6	5	95	5.82	0.0029	24.444	0.0122
CL	Purple Primer/Cleaner	804000N072655	160	OZ	0.79	6.6	7.9	100	100	7.9	0.004	33.18	0.0166
CL	Aircraft Surface Cleaning Compound	6850013907816	2.75	LB	0.95	7.93	2.61	100	50	1.305	0.0007	5.481	0.0027
CL	ES 1661 Cleaning Compound	6850013949514-1	180	OZ	1.57	13.11	17.66	100	100	17.66	0.0088	74.172	0.0371
CL	Solvent Cleaning Compound	6850013980987	12	EA			12	100	75	9	0.0045	37.8	0.0189
CL	Brake Cleaner	6850P4620	1380	OZ	0.869	7.26	75.04	100	95	71.29	0.0356	299.42	0.1497
CL	Simple Green Cleaner Solvent	7930013424145	55	GL	1.03	8.6	472.77	100	5.6	26.48	0.0132	111.22	0.0556
CL	Simple Green Degreaser / Cleaner	7930013425315-1	24	OZ	1.03	8.6	1.55	100	5.6	0.09	5E-05	0.378	0.0002
CL	Citrus Chisel 167 Cleaner	7930P167	1920	OZ	1.069	8.93	128.4	100	10	12.84	0.0064	53.928	0.027
CL	Fast Orange Cleaner	8520014070164	256	OZ	1.03	8.6	16.48	100	10	1.648	0.0008	6.9216	0.0035
CL	Lime Remover & Descaler	6850P000060462(	270	LB	1	8.35	270					0	
D	Shopmaster Degreaser	6850014439519-1	126.4	OZ	1.03	8.6	8.14	5	95	0.39	0.0002	1.638	0.0008
D	Shopmaster Degreaser	6850P5770-808	8.25	GL	1.03	8.6	70.92	5	25	0.89	0.0004	3.738	0.0019
D	Carb & Choke Cleaner	6850P80079	384	OZ			24	100	75	18	0.009	75.6	0.0378
D	Work Horse Cleaner / Degreaser	6850PWHC032	7392	OZ	1.12	9.35	517.44	100	6	31.04	0.0155	130.37	0.0652
D	Work Horse Degreaser	6850PWHC032-5!	55	GL	1.12	9.35	514.08	100	6	30.84	0.0154	129.53	0.0648
D	TNT Brake Washer Fluid	793000F037389	15	GL	1.02	8.52	127.68	100	100	127.68	0.0638	536.26	0.2681
D	Tubmate Cleaner / Degreaser	793000F039292	2.25	LB	1	8.35	2.25	100	5	0.113	6E-05	0.4746	0.0002
D	PF Degreaser	7930013282030	1	GL	0.76	6.35	6.34	50	100	3.17	0.0016	13.314	0.0067
D	PF Cleaner / Degreaser	7930013285959-1	6	PT			6.26	100	30	1.88	0.0009	7.896	0.0039
FA	Fuel Injector Cleaner	6810P400-0010	1	BT	0.89	7.43	0.89	100	20	0.18	9E-05	0.756	0.0004
FA	Fuel, Engine Primer	6850008237861-1	286	OZ			17.88	99	95	16.8	0.0084	70.56	0.0353
FA	Stabilizer Additive (Fuelsaver)	6850012466544	640	OZ	1	8.35	40	100	10	4	0.002	16.8	0.0084
FA	Fuel Injector Cleaner	6850P7490	360	OZ	0.8	6.68	18	100	100	18	0.009	75.6	0.0378
G	Aircraft Grease	9150001199291	3	OZ			0.19					0	
G	Aircraft Grease (Royco)	9150001817724	32	OZ			2					0	
G	Molybdenum Disulfide Grease	9150007542595	19.95	LB			19.95					0	
G	Aircraft Grease	9150009354017	35	OZ	1	8.35	2.2					0	
G	Aircraft Grease (Shell)	9150009355851	105	LB			105					0	
G	Molybdenum Disulfide Grease	9150009436880	0.4	OZ	1.8	15.03	0.05					0	
G	ACFT Grease	9150009448953	18.6	LB			18.6					0	
G	Aircraft & Instrument Grease	9150009857245	0.8	OZ			0.05					0	
G	Aircraft Grease	9150009857246	3.6	LB			3.6					0	
G	Aircraft & Instrument Grease (Royco)	9150009857248	7	LB	1	8.35	7					0	
G	White Grease	915000D005514	240	OZ	1.14	9.52	17.1		70			0	
G	Aeroshell Grease	9150012623358	392	OZ			24.5					0	
G	White Grease	9150P81870	261	OZ	0.701	5.85	11.43					0	
HF	Hydraulic Fluid	9150001806290	165	GL	0.95	7.93	1270.15					0	

Client: Malmstrom AFB
Location: Base-wide
Subject: Miscellaneous Chemical Usage

Date: 09/06/2000
Emissions: 1999 Actual
Calc by: *NM/TLW*

Parameter

1. Miscellaneous Chemicals include Laboratory chemicals and general solvent chemicals used at Malmstrom AFB
2. Emissions are determined based on material balance.
3. Chemical compositions are from 2761 reports, EMIS database, and MSDS database provided by Mr. Don Delorme, HAZMART.

										Actual		Potential	
USAGE	Chemical Name	NSN Number	1999 Quantity	Units	SG	Density lbs. / unit	1999 Pounds	Percent to Air	VOC%	LBS	TNS	LBS	TNS
HF	Hydraulic Fluid (Royal)	9150002659408	11	GL	0.85	7.1	78.03					0	
HF	Auto Trans Hydraulic Fluid (Dexron III)	9150013534799	1536	OZ	0.869	7.26	83.42					0	
L	Denatured Alcohol	6810002010906	15.2	OZ	0.81	6.76	0.77	100	100	0.77	0.0004	3.234	0.0016
L	Denatured Alcohol	6810002056786	3.2	OZ	0.82	6.85	0.16	100	100	0.16	8E-05	0.672	0.0003
L	Acetone Technical	6810002232739	64.8	OZ	0.79	6.6	3.2	100	100	3.2	0.0016	13.44	0.0067
L	Technical Toluene	6810002812002	128	OZ	0.869	7.26	6.96	100	100	6.96	0.0035	29.232	0.0146
L	MEK	6810002812785	524.8	OZ	0.81	6.76	26.6	100	100	26.6	0.0133	111.72	0.0559
L	Denatured Alcohol	6810005437415	384	OZ	0.81	6.76	12.96	100	100	12.96	0.0065	54.432	0.0272
L	Petroleum Ether/Tec	6810005843079	384	OZ	0.64	5.34	15.36	100	100	15.36	0.0077	64.512	0.0323
L	Titrating Solution	6810007989667	160	OZ	1.03	8.6	10.3	5	30	0.155	8E-05	0.651	0.0003
L	Pan Indicator	681000N026131	1	ML	1.04	8.68	0.002	100	75	0.0015	8E-07	0.0063	3E-06
L	Dissolved Oxygen Reagent	681000N070540	50	EA	1.449	12.1	11.02	50	10	0.55	0.0003	2.31	0.0012
L	Chlorine	6810012425750	1000	ML	1.76	14.7	2.11	100	5	0.105	5E-05	0.441	0.0002
L	Untreat #6	6810P0168	5	GL	1.099	9.18	45.9	100	5	2.3	0.0012	9.66	0.0048
L	Leak Test Compound	6850006211819	60.8	OZ	1.09	9.1	4.14	100	99.7	4.13	0.0021	17.346	0.0087
L	Penatrating Fluid	6850009739091	2.4	OZ	1.01	8.43	0.15	95	20	0.03	2E-05	0.126	6E-05
L	Demineralizer	685000F004148	100	ML	1.2	10.02	0.22	100	60	0.13	7E-05	0.546	0.0003
LU	Wire Pulling Lubricant	9150004228099	640	OZ			40		90			0	
LU	10 YD Lubricant	9150005068497	36	OZ			2.25					0	
LU	Ait Oil Lube	9150007822627	0.1	QT	0.95	7.93	0.2					0	
LU	Slyde II Lubricating Compound	9150008237860	59.2	OZ			3.7		93			0	
LU	Dry Film Lubricant	915000F038808	46	OZ			2.87					0	
LU	Wire Rope Lubricant	915000N009319	576	OZ	1.26	10.52	45.36		96			0	
LU	Gear Oil	9150010355392	0.75	QT	0.869	7.26	1.36		1			0	
LU	Cleaner, Lubricant & Preservative	9150010546453	712	OZ	0.86	7.18	38.27		24.5			0	
LU	Cleaner, Lubricant & Preservative	9150011021473	9.5	OZ	0.88	7.35	0.53		24.5			0	
LU	Solid Film Lubricant	9150012602534	368	OZ	1	8.35	23					0	
LU	Lubricating Engine Oil	9150014385875-1	8595.2	OZ			537.2					0	
LU	Engine Lubricating Oil	9150014385891	720.5	GL			6012.8					0	
LU	Engine Lubricating Oil	9150014385905-1	24	QT			50.07					0	
LU	Engine Lubricating Oil	9150014386066	55	GL			459					0	
LU	Engine Lubricating Oil	9150014386079	1265	GL			10556.8					0	
LU	Aqua-Gel CW Lubricant (Wire)	9150P31-371	640	OZ	1.09	9.1	43.6					0	
LU	CS 300 Lubricant	9150PCS-300	640	OZ	1	8.35	40					0	
LU	Lubricant	9150PLUBE	19	OZ	0.74	6.18	0.88					0	
LU	Liquid Wrench	9150010917500	128	OZ			8		90			0	
M	Insulating Compound	5970009904924	12	OZ			0.75	100	85.9	0.64	0.0003	2.688	0.0013
M	Naptha 1 GL	6810002388119	1.25	GL	0.75	6.26	7.82	100	100	7.82	0.0039	32.844	0.0164
M	Orange CPVC Solvent Cement	6840P31131	64	OZ	0.09	0.75	0.36	100	85	0.306	0.0002	1.2852	0.0006
M	Orange CPVC Solvent Cement	6840P44391	48	OZ	0.09	0.75	0.27	100	85	.23	0.0001	0.966	0.0005

Client: Malmstrom AFB
Location: Base-wide
Subject: Miscellaneous Chemical Usage

Date: 09/06/2000
Emissions: 1999 Actual
Calc by: *NM/TLW*

Parameter

1. Miscellaneous Chemicals include Laboratory chemicals and general solvent chemicals used at Malmstrom AFB
2. Emissions are determined based on material balance.
3. Chemical compositions are from 2761 reports, EMIS database, and MSDS database provided by Mr. Don Delorme, HAZMART.

										Actual		Potential	
USAGE	Chemical Name	NSN Number	1999 Quantity	Units	SG	Density lbs. / unit	1999 Pounds	Percent to Air	VOC%	LBS	TNS	LBS	TNS
M	Vapor Corrosion Inhibitor	6850P052712	6.4	OZ	1	8.35	0.4	100	20	0.08	4E-05	0.336	0.0002
M	Vulcanizing (Rema tip/top)	6850P203	8	CN	1.45	12.11	8	100	100	8	0.004	33.6	0.0168
M	Fluid Cutting	9150004506938	14.5	OZ	1	8.35	0.91	100	85	0.77	0.0004	3.234	0.0016
M	Type Cleaner	7510006169588	36.06	OZ	0.901	7.52	2.03	100	20	0.406	0.0002	1.7052	0.0009
M	Quikfil 530 Cleaner/Deodorizer	793000F032557	5	GL	1.06	8.85	44.23	100	16	7.08	0.0035	29.736	0.0149
M	Quikfil 910 Cleaner/Deodorizer	793000F032559	5	GL	1.22	10.19	50.91	100	14	7.13	0.0036	29.946	0.015
M	Antiseize Compound	8030001556444	496.8	OZ			31.05	1	25	0.078	4E-05	0.3276	0.0002
M	Thread Locker	803000D007333	2.04	OZ	1.11	9.27	0.142	100	5	0.007	4E-06	0.0294	1E-05
M	Preservative Compound	8030011032868	96	OZ			6	100	2	0.12	6E-05	0.504	0.0003
M	Antiseize Compound	8030012342792	0.8	OZ	1.23	10.27	0.062	100	70	0.043	2E-05	0.1806	9E-05
M	Silkaflex	8030AA169P	103	OZ	1.19	9.94	7.66	100	90	6.9	0.0035	28.98	0.0145
M	All Purpose Joint Compound	8030L005044462€	5	GL			41.73	40	75	12.52	0.0063	52.584	0.0263
M	Acrylic Caulk	8030P10202	600	OZ	1.497	12.5	56.14	45	20	5.05	0.0025	21.21	0.0106
M	Red Threadlocker	8030P271	14.64	OZ			0.92	100	5	0.046	2E-05	0.1932	1E-04
M	Joint Sealer	8030P2C	132	OZ	1.15	9.6	9.49	100	15	1.42	0.0007	5.964	0.003
M	Cement	8030P3201/134	0.3	GL	1.15	9.6	2.88	100	100	2.88	0.0014	12.096	0.006
M	White Spackling Compound	8030PAA566U	80	OZ	0.41	3.42	2.05	100	2	0.041	2E-05	0.1722	9E-05
M	Rema Special Cement	8030PBL-8	32	OZ			2	100	50	1	0.0005	4.2	0.0021
M	Crack Filler	8030PFILLER	5184	OZ	1.501	12.53	486.32	100	1	4.86	0.0024	20.412	0.0102
M	PVC Pipe Cleaner	804000N066701	32	OZ			2	100	100	2	0.001	8.4	0.0042
M	Belzona Catalyst Compound	8040P4141	60	GL	0.99	8.27	495.71	100	50	247.86	0.1239	1041	0.5205
M	Urethane Foam	8040P4330	102	OZ	1.23	10.27	7.84	100	100	7.84	0.0039	32.928	0.0165
M	Gasket Eliminator	8040P518	50.7	OZ	1.101	9.19	3.49	100	25	0.87	0.0004	3.654	0.0018
M	Calking Compound	8030001806339	590	OZ	1.03	8.6	37.98		5			0	
M	Insect Repellant	6840013450237-1	789	OZ			49.31					0	
M	Propane		636.5	OZ	0.52	4.34	20.68	100	100	20.68	0.0103	86.856	0.0434
M	IPA		3668.74	OZ	0.79	6.6	181.14	100	100	181.14	0.0906	760.79	0.3804
M	Joint Compound	5640004549351	1920	OZ	1.6	13.36	144	100	35	50.4	0.0252	211.68	0.1058
M	Electrical Cable Insulation Repair Kit	5970000320291	2	KT	1.12	9.35	4.67	100	6	0.28	0.0001	1.176	0.0006
M	Cooling Water Microbicide	6810PMBC215	640	OZ	1.03	8.6	41.2	100	95	39.14	0.0196	164.39	0.0822
M	Methylphenyl Compound	8040001177258	2	PT	1.42	11.86	0.25	100	50	0.125	6E-05	0.525	0.0003
P	Red Enamel	5970009015331	0.02	OZ	1.101	9.19	0.001	100	62	0.0006	3E-07	0.0025	1E-06
P	Paint Thinner	6810005844071	320	OZ	0.869	7.26	17.4	100	100	17.4	0.0087	73.08	0.0365
P	Ink, Marking Stencil	7510001837697	10	PT	0.76	6.35	7.93	100	67	5.31	0.0027	22.302	0.0112
P	Yellow Marking Stencil Paint	7510001837698	160.64	OZ	0.782	6.53	7.85	100	62	4.87	0.0024	20.454	0.0102
P	Marking Stencil Ink (Opaque)	7510004697910	256	OZ	0.782	6.53	12.48	92	1	0.115	6E-05	0.483	0.0002
P	Brown Primer Paint	8010000675434	832	OZ			52	85	85	37.57	0.0188	157.79	0.0789
P	Red Enamel, Aerosol	8010000793760	64.16	OZ	1	8.35	4.01	100	81.9	3.28	0.0016	13.776	0.0069
P	Gray Enamel SemiGloss	8010000870105	64	OZ	1.11	9.27	4.44	100	48.3	2.14	0.0011	8.988	0.0045
P	Gray Enamel Aerosol	80100011671139	480	OZ	0.79	6.6	23.7	100	80	18.96	0.0095	79.632	0.0398

Client: Malmstrom AFB
Location: Base-wide
Subject: Miscellaneous Chemical Usage

Date: 09/06/2000
Emissions: 1999 Actual
Calc by: *NM/TLW*

Parameter
1. Miscellaneous Chemicals include Laboratory chemicals and general solvent chemicals used at Malmstrom AFB
2. Emissions are determined based on material balance.
3. Chemical compositions are from 2761 reports, EMIS database, and MSDS database provided by Mr. Don Delorme, HAZMART.

										Actual		Potential	
USAGE	Chemical Name	NSN Number	1999 Quantity	Units	SG	Density lbs. / unit	1999 Pounds	Percent to Air	VOC%	LBS	TNS	LBS	TNS
P	White Enamel Paint	8010001322865	72	OZ			4.5	90	100	4.05	0.002	17.01	0.0085
P	Red Enamel Aerosol Paint	8010001412952	96.32	OZ	0.95	7.93	5.72	100	90	5.15	0.0026	21.63	0.0108
P	Paint Thinner	8010001655540	96	OZ			6	100	100	6	0.003	25.2	0.0126
P	Polyurethane Paint Thinner	8010001818080	12.8	OZ	0.849	7.09	0.68	100	100	0.68	0.0003	2.856	0.0014
P	White Enamel Paint	8010002906983	36.84	OZ			2.3	90	100	2.07	0.001	8.694	0.0043
P	Yellow Enamel Paint	8010002970585	0.08	GL	1.101	9.19	0.68	88	46	0.28	0.0001	1.176	0.0006
P	Gray Enamel Gloss	8010002982298	61.44	OZ	1.14	9.52	4.38	100	49	2.15	0.0011	9.03	0.0045
P	White Paint	8010005151596	0.96	OZ	1.301	10.86	0.078	90	42	0.03	2E-05	0.126	6E-05
P	Topside Grey Enamel	8010005305565	143.36	OZ	1.401	11.7	12.55	100	48.3	6.06	0.003	25.452	0.0127
P	Rubber Paint	8010005824743	240.32	OZ	1.069	8.93	16.06	75	76	9.15	0.0046	38.43	0.0192
P	Flat Black Enamel Paint	8010005825382	946.56	OZ			59.16	75	88	39.05	0.0195	164.01	0.082
P	Green Aerosol Paint	8010005843154	64	OZ			4	100	30	1.2	0.0006	5.04	0.0025
P	Red Enamel EXT Gloss Paint	8010006167486	0.02	GL	1.09	9.1	0.18	100	100	0.18	9E-05	0.756	0.0004
P	Black Enamel Gloss Paint	8010006169143	705.28	OZ			44.08	75	90	29.75	0.0149	124.95	0.0625
P	Black Gloss Enamel	8010006169143	384	OZ			24	75	100	18	0.009	75.6	0.0378
P	White Enamel Paint	8010006644761	10.24	OZ	1.32	11.02	0.84	90	28.13	0.213	0.0001	0.8946	0.0004
P	Brown Enamel Aerosol	8010007219742	0.24	OZ			0.015	100	83	0.012	6E-06	0.0504	3E-05
P	Red Enamel Paint	8010007219743	256.64	OZ	0.93	7.77	14.92	100	100	14.92	0.0075	62.664	0.0313
P	Yellow Enamel Paint	8010007219744	48	OZ			3	88	85	2.24	0.0011	9.408	0.0047
P	White Enamel Paint	8010007829356	224.96	OZ			14.06	90	100	12.65	0.0063	53.13	0.0266
P	Paint Thinner	8010008377969	24	OZ			1.5	100	100	1.5	0.0008	6.3	0.0032
P	Yellow Enamel Paint	8010008529033	2.07	PT			2.16	88	100	1.9	0.001	7.98	0.004
P	Medium Gray Enamel	8010008529034	0.48	OZ	0.92	7.68	0.03	100	100	0.03	2E-05	0.126	6E-05
P	Red Enamel Paint	8010008897345	0.32	OZ	1.101	9.19	0.022	100	41.2	0.906	0.0005	3.8052	0.0019
P	Primer Coating Green	8010008998825	132	OZ			8.25	100	100	8.25	0.0041	34.65	0.0173
P	Epoxy Kit	8010009357080	24	OZ			1.5	100	33	0.5	0.0003	2.1	0.0011
P	Blue Enamel Paint	8010009881458	18.88	OZ			1.18	85	100	1.003	0.0005	4.2126	0.0021
P	Cherry Red Industrial Paint	801000D020104	176	OZ			11	100	100	11	0.0055	46.2	0.0231
P	Enamel Paint Reducers	801000F003497	128	OZ			8	100	100	8	0.004	33.6	0.0168
P	DX685 Paint	801000F006024	1	QT	0.98	8.18	2.05	100	100	2.05	0.001	8.61	0.0043
P	Epoxy Primer Paint	801000F006649	128	OZ			8	100	63	5.04	0.0025	21.168	0.0106
P	Corrosion Resistant Compound	801000F007713	384	OZ	1.301	10.86	31.2	100	10	3.12	0.0016	13.104	0.0066
P	Paint Thinner	801000F031384	640	OZ	0.78	6.51	31.2	100	100	31.2	0.0156	131.04	0.0655
P	Acrylic Latex Resin Coating	801000F031516	1508	OZ			94.25	100	64.6	60.89	0.0304	255.74	0.1279
P	Polyurethane Paint, Clear	801000F031528	256	OZ			16	100	59.8	9.57	0.0048	40.194	0.0201
P	Acrylic Paint	801000F045306	32	OZ			2	100	100	2	0.001	8.4	0.0042
P	Topcoats Primer Paint	801000N025998	48	OZ			3	100	100	3	0.0015	12.6	0.0063
P	Magma TX Conditioner	801000N056409	1952	OZ	1.15	9.6	140.3	100	93	130.48	0.0652	548.02	0.274
P	White Marking Paint	801000N059492	102	OZ			6.38	90	90	5.17	0.0026	21.714	0.0109
P	Release Agent	801000N063362	84.72	OZ	1.24	10.35	6.57	100	100	6.57	0.0033	27.594	0.0138

Client: Malmstrom AFB
Location: Base-wide
Subject: Miscellaneous Chemical Usage

Date: 09/06/2000
Emissions: 1999 Actual
Calc by: *NM/TLW*

Parameter

1. Miscellaneous Chemicals include Laboratory chemicals and general solvent chemicals used at Malmstrom AFB
2. Emissions are determined based on material balance.
3. Chemical compositions are from 2761 reports, EMIS database, and MSDS database provided by Mr. Don Delorme, HAZMART.

										Actual		Potential	
USAGE	Chemical Name	NSN Number	1999 Quantity	Units	SG	Density lbs. / unit	1999 Pounds	Percent to Air	VOC%	LBS	TNS	LBS	TNS
P	Flat Black Paint	801000N073781	24	OZ			1.5	75	100	1.125	0.0006	4.725	0.0024
P	Orange Marking Paint	801000N080009	432	OZ			27	100	100	27	0.0135	113.4	0.0567
P	Epoxy Primer Paint	801000N090047	128	OZ			8	100	63	5.04	0.0025	21.168	0.0106
P	Coating Primer (A)	8010011930519	48	OZ	1.71	14.28	5.13	100	43.3	2.22	0.0011	9.324	0.0047
P	Coating Primer (B)	8010011930519	48	OZ	1.131	9.44	3.4	100	21.8	0.74	0.0004	3.108	0.0016
P	Heat Resistant Black Paint	8010012354166	1	GL	1.44	12.02	12.02	100	48.62	5.84	0.0029	24.528	0.0123
P	Olive Drab Enamel Paint	8010013331441-1	320	OZ	0.89	7.43	17.8	85	90	13.62	0.0068	57.204	0.0286
P	Polyurethane Coating	8010013363032	0.08	GL	1.48	12.36	0.007	100	65.8	0.005	3E-06	0.021	1E-05
P	Polyurethane Blue	8010013973942	5.12	OZ			0.32	100	100	0.32	0.0002	1.344	0.0007
P	Gray Polyurethane Paint	8010013973977	4	QT	1.21	10.1	10.1	100	53.8	5.43	0.0027	22.806	0.0114
P	Paint Products Enamel Thinner	8010014415940	56.32	OZ	0.78	6.51	2.75	100	100	2.75	0.0014	11.55	0.0058
P	Acrylic Latex Flat Paint	8010P01-235	10	GL			83.5	100	100	83.5	0.0418	350.7	0.1754
P	White Acrylic Paint	8010P01-236WB	32	OZ			2	100	100	2	0.001	8.4	0.0042
P	White Latex Coating Acrylic Paint	8010P01-755-WB	32	OZ			2	100	100	2	0.001	8.4	0.0042
P	White Latex paint	8010P02752WB	3	GL			25.05	100	100	25.05	0.0125	105.21	0.0526
P	Aerosol Enamel Paint (Antique Linen)	8010P03241-2357	288	OZ	0.66	5.51	9.9	100	100	9.9	0.005	41.58	0.0208
P	Aerosol Enamel Paint (Tobacco Brown)	8010P03241-3705	576	OZ	0.66	5.51	23.76	100	100	23.76	0.0119	99.792	0.0499
P	White Semi-gloss Base Enamel Paint	8010P03-241WB	32	OZ			2	100	100	2	0.001	8.4	0.0042
P	Blue Marking Paint	8010P03621	2227	OZ	0.8	6.68	111.35	100	100	111.35	0.0557	467.67	0.2338
P	Green Marking Paint	8010P03631	2397	OZ	0.8	6.68	119.85	100	65.75	78.8	0.0394	330.96	0.1655
P	Hi-Vis Yellow Marking Paint	8010P03821	1638	OZ	0.8	6.68	81.9	100	100	81.9	0.041	343.98	0.172
P	Red Oxide Primer	8010P04-022	7	GL	1.28	10.69	74.82	100	62.54	46.79	0.0234	196.52	0.0983
P	Columbia Paint	8010P04400	256	OZ			16	100	100	16	0.008	67.2	0.0336
P	Gray Polyurethane Paint	8010P0440004	640	OZ	1.08	9.02	43.2	100	40.7	17.58	0.0088	73.836	0.0369
P	Brown Polyurethane Paint	8010P0440027	128	OZ			8	100	100	8	0.004	33.6	0.0168
P	Yellow Polyurethane Paint	8010P04-400-62	128	OZ	1.08	9.02	8.64	100	40.7	3.52	0.0018	14.784	0.0074
P	Urethane Sealant	8010P08609	120	OZ			7.5	100	100	7.5	0.0038	31.5	0.0158
P	Wallboard Joint Compound	8010P10102	9600	OZ	1.6	13.36	960	100	35	336	0.168	1411.2	0.7056
P	Aerosol Paint	8010P1440	128	OZ			8	100	100	8	0.004	33.6	0.0168
P	Flat Black Enamel Paint	8010P20033	912	OZ	0.79	6.6	45.03	75	100	33.77	0.0169	141.83	0.0709
P	Red Marking Paint	8010P220	459	OZ	0.8	6.68	22.95	100	90	20.66	0.0103	86.772	0.0434
P	Flourescent Orange	8010P222	1343	OZ			83.93	100	85	71.34	0.0357	299.63	0.1498
P	Blue Latex Enamel Paint	8010P309BLUE	32	OZ			2	85	66	1.12	0.0006	4.704	0.0024
P	Dark Gray Latex Enamel	8010P309DRKGR	32	OZ			2	100	66	1.32	0.0007	5.544	0.0028
P	Orange Latex Enamel Paint	8010P309ORANG	32	OZ			2	100	66	1.32	0.0007	5.544	0.0028
P	Red Latex Enamel Paint	8010P309RED	8	OZ			0.5	100	66	0.33	0.0002	1.386	0.0007
P	White Latex Enamel Paint	8010P309WHITE	8	OZ			0.5	90	66	0.3	0.0002	1.26	0.0006
P	Yellow Latex Enamel Paint	8010P309YELLOV	32	OZ			2	88	66	1.16	0.0006	4.872	0.0024
P	Enamel Gloss Red Paint	8010P-3827	128	OZ	1.02	8.52	8.16	100	52.52	4.29	0.0021	18.018	0.009

Client: Malmstrom AFB
Location: Base-wide
Subject: Miscellaneous Chemical Usage

Date: 09/06/2000
Emissions: 1999 Actual
Calc by: *NM/TLW*

Parameter
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2. Emissions are determined based on material balance.
3. Chemical compositions are from 2761 reports, EMIS database, and MSDS database provided by Mr. Don Delorme, HAZMART.

										Actual		Potential	
USAGE	Chemical Name	NSN Number	1999 Quantity	Units	SG	Density lbs. / unit	1999 Pounds	Percent to Air	VOC%	LBS	TNS	LBS	TNS
P	Enamel Gloss Black (Brush On)	8010P-3860	128	OZ	0.98	8.18	7.84	75	52.73	3.1	0.0016	13.02	0.0065
P	Light Wt. Body Filler	8010P394	1280	OZ	1.05	8.77	84	100	18	15.12	0.0076	63.504	0.0318
P	Aerosol Paint	8010P5068	12	OZ			0.75	100	100	0.75	0.0004	3.15	0.0016
P	Putty-Cote	8010P590	24	OZ	1.08	9.02	1.62	100	30	0.49	0.0002	2.058	0.001
P	Clear Satin Laquer	8010P7018	12	OZ			0.75	100	100	0.75	0.0004	3.15	0.0016
P	Aerosol Paint	8010P8141	144	OZ			9	100	56.6	5.09	0.0025	21.378	0.0107
P	Paint Thinner	8010P9121	384	OZ	0.94	7.85	22.56	100	100	22.56	0.0113	94.752	0.0474
P	Red Enamel Aerosol Paint	8010P9778612	132	OZ	0.731	6.1	6.03	100	100	6.03	0.003	25.326	0.0127
P	Flat Black Enamel Aerosol Paint	8010P9778618	60	OZ	0.8	6.68	3	75	100	2.25	0.0011	9.45	0.0047
P	Fluorscent Orange Aerosol Paint	8010P9778675	85	OZ	0.84	7.01	4.45	100	100	4.45	0.0022	18.69	0.0093
P	Red Iron Oxide Aerosol Paint	8010P9778685	90	OZ	0.88	7.35	4.95	100	100	4.95	0.0025	20.79	0.0104
P	Black Aerosol Paint	8010P9778697	80	OZ	0.84	7.01	4.2	75	100	3.15	0.0016	13.23	0.0066
P	Urethane Hardener Paint	8010PDAU2	2	GL			16.7	100	100	16.7	0.0084	70.14	0.0351
P	Dark Green Paint	8010PDAU45853	2	PT			2.08	100	100	2.08	0.001	8.736	0.0044
P	Basecoat Paint	8010PDBU14308	96	OZ			6	100	51	3.06	0.0015	12.852	0.0064
P	Basecoat Paint	8010PDBUXXX	9	GL			75.11	100	100	75.11	0.0376	315.46	0.1577
P	Basecoat Converter Paint	8010PDBX689	1792	OZ			112	100	100	112	0.056	470.4	0.2352
P	DBX Paint	8010PDBXX	1408	OZ			88	100	100	88	0.044	369.6	0.1848
P	Clear Polyurethane Paint	8010PDCU2001	256	OZ			16	100	100	16	0.008	67.2	0.0336
P	High Solids Polyurethane Clear Paint	8010PDCU2002	256	OZ	0.946	7.9	15.14	100	56.64	8.58	0.0043	36.036	0.018
P	Low VOC Clear Acrylic Urethane Paint	8010PDCU2042	768	OZ	0.946	7.9	45.41	100	56.64	25.72	0.0129	108.02	0.054
P	High Solids Hardener	8010PDCX61	37	GL	1.069	8.93	330.08	100	21.18	69.91	0.035	293.62	0.1468
P	Light Wt. Filler Paint	8010PDF700	256	OZ			16	100	100	16	0.008	67.2	0.0336
P	Urethane Hardener Paint	8010PDFX7	32	OZ			2	100	100	2	0.001	8.4	0.0042
P	PPG Paint	8010PDMCXX	48	QT	0.68	5.68	68.1	100	100	68.1	0.0341	286.02	0.143
P	DMD 623 Mixing Acrylic Urethane Paint	8010PDMDXXXX	122	QT	1.02	8.52	259.62	100	57.1	148.24	0.0741	622.61	0.3113
P	Delta Mixing Bases	8010PDMHS	1	GL	1.32	11.02	11.02	100	33.57	3.7	0.0019	15.54	0.0078
P	Primer Epoxy Paint	8010PDP40	4	GL			33.38	100	100	33.38	0.0167	140.2	0.0701
P	Black Epoxy Primer	8010PDP401	10	GL			80.35	100	100	80.35	0.0402	337.47	0.1687
P	Primer Epoxy Paint	8010PDP402	12	GL			100.14	100	100	100.14	0.0501	420.59	0.2103
P	Primer Epoxy Paint	8010PDP90	15	GL			125.18	100	100	125.18	0.0626	525.76	0.2629
P	Primer Epoxy Paint	8010PDP90Q	2	QT			4.17	100	100	4.17	0.0021	17.514	0.0088
P	Reducer	8010PDT895	2	GL	0.849	7.09	14.18	100	100	14.18	0.0071	59.556	0.0298
P	All Purpose Laquer Thinner	8010PDTL16	20	GL	0.8	6.68	133.6	100	60	80.16	0.0401	336.67	0.1683
P	Urethane Hardener Paint	8010PDU5	6	GL	1.01	8.43	50.57	100	53.6	27.1	0.0136	113.82	0.0569
P	Roadguard	8010PDX54	1	PT	1.01	8.43	1.05	100	85	0.89	0.0004	3.738	0.0019
P	Basecoat Activator	8010PDX57	20	PT	1.06	8.85	22.11	100	100	22.11	0.0111	92.862	0.0464
P	DX820 Paint	8010PDX820	1	QT	1.2	10.02	2.51	100	100	2.51	0.0013	10.542	0.0053
P	Bar-B-Que Paint	8010PE1000-150	204	OZ	1	8.35	12.75	100	80	10.2	0.0051	42.84	0.0214
P	Primer Paint	8010PK200	1024	OZ	1.301	10.86	83.26	100	100	83.26	0.0416	349.69	0.1748

Client: Malmstrom AFB
Location: Base-wide
Subject: Miscellaneous Chemical Usage

Date: 09/06/2000
Emissions: 1999 Actual
Calc by: *NM/TLW*

Parameter
1. Miscellaneous Chemicals include Laboratory chemicals and general solvent chemicals used at Malmstrom AFB
2. Emissions are determined based on material balance.
3. Chemical compositions are from 2761 reports, EMIS database, and MSDS database provided by Mr. Don Delorme, HAZMART.

										Actual		Potential	
USAGE	Chemical Name	NSN Number	1999 Quantity	Units	SG	Density lbs. / unit	1999 Pounds	Percent to Air	VOC%	LBS	TNS	LBS	TNS
P	Primer Paint	8010PK201	384	OZ	0.85	7.1	27.2	100	100	27.2	0.0136	114.24	0.0571
P	Acrylic Latex Primer	8010PK36	384	OZ			32	100	100	32	0.016	134.4	0.0672
P	Urethane Primer Surfacer	8010PK38	384	OZ	1.49	12.44	47.68	100	100	47.68	0.0238	200.26	0.1001
P	Corrosion Resistant Coating	8010PNCP270	1	GL	1.529	12.77	12.77	100	47.26	6.04	0.003	25.368	0.0127
P	Corrosion Resistant Primer	8010PNCX275	1	GL	1.02	8.52	8.52	100	41.8	3.56	0.0018	14.952	0.0075
P	Light Oak Oil Stain	8010POAKSTAIN	512	OZ			32	100	61	19.52	0.0098	81.984	0.041
P	Frost Blue Paint	8010PRL92	54	OZ			3.38	20	20	0.135	7E-05	0.567	0.0003
P	PRL Paints for Trans Mixing Mach.	8010PRLXX	18	OZ			1.13	50	50	0.28	0.0001	1.176	0.0006
P	Corrosion Preventative Compound	8030005468637	41.6	OZ			2.6	100	100	2.6	0.0013	10.92	0.0055
P	Preventative Corrosion Compound	8030009381947	0.45	PT	0.92	7.68	0.46	100	38	0.17	9E-05	0.714	0.0004
P	3M Paint	8030012507246	2.88	GL	1.02	8.52	24.52	100	100	24.52	0.0123	102.98	0.0515
P	Black Aerosol Enamel Paint	8030P140-0506	120	OZ			7.5	75	100	5.63	0.0028	23.646	0.0118
P	Gray Aerosol Enamel Paint	8030P140-0621	120	OZ			7.5	100	100	7.5	0.0038	31.5	0.0158
P	Enamel Paint	8030PB55T104	15	GL			125.25	100	100	125.25	0.0626	526.05	0.263
P	Reducer	8030PDT860	11	GL			91.8	100	100	91.8	0.0459	385.56	0.1928
P	Reducer	8030PDT870	29	GL			242	100	100	242	0.121	1016.4	0.5082
P	Reducer	8030PDT885	20	GL			166.91	100	100	166.91	0.0835	701.02	0.3505
P	High Solids Urethane Clear Coat	8040PDCU2021	3840	OZ			240	100	45	108	0.054	453.6	0.2268
P	Corrosion Preventive Compound (Dow)	9150P1970631	4.8	OZ			0.3					0	
P	Ford Blue Paint	801000F046657	32	OZ	1	8.35	2	100	100	2		8.4	
S	Sealant 2-Part (1)	6850P2308/1245	2640	OZ	1.17	9.77	193.05	100	30	57.92	0.029	243.26	0.1216
S	Sealant 2-Part (2)	6850P2308/1245	2640	OZ	1.54	12.86	254.1	100	10	25.41	0.0127	106.72	0.0534
S	Courtaulds Sealing Compound (1)	8030000087198	4	PT	1.38	11.52	4.17	60	40	1	0.0005	4.2	0.0021
S	Courtaulds Sealing Compound (2)	8030000087198	4	PT	1.4	11.69	4.17	60	40	1	0.0005	4.2	0.0021
S	Sealing Kit Compound	8030000087200	3.2	OZ	1.8	15.03	0.36	75	40	0.108	5E-05	0.4536	0.0002
S	800 Industrial Seal	8030000802171	3.2	OZ	1.04	8.68	0.21	80	48	0.08	4E-05	0.336	0.0002
S	Sealing Compound	8030000812328	180	CC	1.101	9.19	0.052	100	100	0.052	3E-05	0.2184	0.0001
S	Sealing Compound	8030002205861	1560	OZ			97.5	100	100	97.5	0.0488	409.5	0.2048
S	Sealing Compound	8030004024957	8	OZ	1.37	11.44	0.685	100	100	0.685	0.0003	2.877	0.0014
S	Sealing Compound	8030004081137	0.25	OZ			0.016	100	50	0.008	4E-06	0.0336	2E-05
S	Sealing Compound	8030005982910	48	OZ	1.901	15.87	5.7	100	35	1.995	0.001	8.379	0.0042
S	Sealing Compound	8030006169191	16	OZ	1.97	16.45	1.97	100	35	0.69	0.0003	2.898	0.0014
S	Sealing Compound	8030007535005	1016.05	OZ	1.97	16.45	125.1	100	3.3	4.13	0.0021	17.346	0.0087
S	Sealing Compound	8030007794700	5	OZ			0.31	100	26	0.081	4E-05	0.3402	0.0002
S	Flamemaster Sealing Compound Pt A	8030008237953	0.1	GL	1.68	14.03	1.4	100	5	0.07	4E-05	0.294	0.0001
S	Flamemaster Sealing Compound Pt B	8030008237953	0.1	GL	3	25.05	2.5	100	3	0.075	4E-05	0.315	0.0002
S	Sealing Compound	8030009996313	55.35	OZ	1.3	10.85	4.5	100	33	1.49	0.0007	6.258	0.0031
S	Sealing Compound	803000F008005	16	OZ	1.68	14.03	1.68	100	1	0.017	9E-06	0.0714	4E-05
S	Concrete Sealer	803000F023999	15	GL	1.04	8.68	130.19	100	80	104.15	0.0521	437.43	0.2187
S	Sealant SL-1	803000F036323	3360	OZ	1.101	9.19	231.21	100	10	23.12	0.0116	97.104	0.0486

Client: Malmstrom AFB
Location: Base-wide
Subject: Miscellaneous Chemical Usage

Date: 09/06/2000
Emissions: 1999 Actual
Calc by: *NM/TLW*

Parameter
1. Miscellaneous Chemicals include Laboratory chemicals and general solvent chemicals used at Malmstrom AFB
2. Emissions are determined based on material balance.
3. Chemical compositions are from 2761 reports, EMIS database, and MSDS database provided by Mr. Don Delorme, HAZMART.

										Actual		Potential	
USAGE	Chemical Name	NSN Number	1999 Quantity	Units	SG	Density lbs. / unit	1999 Pounds	Percent to Air	VOC%	LBS	TNS	LBS	TNS
S	Thread Sealant	803000N026502	96	OZ	1.41	11.77	8.46	100	33	2.79	0.0014	11.718	0.0059
S	Sealing Compound	8030011250055	9	OZ			0.56	100	50	0.28	0.0001	1.176	0.0006
S	Yellow Sealing Compound	8030011633483	3	OZ			0.19	100	50	0.095	5E-05	0.399	0.0002
S	Courtaulds Sealing Compound	8030011840328	12.75	OZ	1.4	11.52	1.12	100	76.5	0.86	0.0004	3.612	0.0018
S	Sealing Compound	8030012950749	18000	GR	0.901	7.52	35.76	100	30	10.73	0.0054	45.066	0.0225
S	Sealing Compound	8030013204710	60	OZ	1.101	9.19	4.13	100	10	0.41	0.0002	1.722	0.0009
S	Corrosion Compound	8030014189006-1	226.4	OZ	0.82	6.85	11.6	100	68	7.89	0.0039	33.138	0.0166
S	Sealing Compound	8030P1142-142	91	OZ	0.901	7.52	5.14	100	74.87	3.85	0.0019	16.17	0.0081
S	Daptex Latex Foam Sealant	8030P18826	432	OZ	1.01	8.43	27.27	100	5	1.36	0.0007	5.712	0.0029
S	Daptex Latex Foam Sealant	8030P18826	32	OZ	1.01	8.43	2.02	100	5	0.101	5E-05	0.4242	0.0002
S	6M Sealant (Loctite)	8030P6M	499.2	OZ			31.2	100	5	1.56	0.0008	6.552	0.0033
S	High Temperature Silicone Sealant	8030P81409	814	OZ			50.88	100	5	2.54	0.0013	10.668	0.0053
S	Climacel Brushable Sealant/Coating	8030PCLI	512	OZ	0.91	7.6	29.12	100	6	1.75	0.0009	7.35	0.0037
S	Daptex Latex Foam Sealant	8030P-DAPTEX	32	OZ	1.01	8.43	2.02	100	5	0.101	5E-05	0.4242	0.0002
S	Pourable Sealer	8030PG400PS	8	GL	1.701	14.2	113.56	100	5	5.68	0.0028	23.856	0.0119
S	Thread Sealant	8030PSS16	32	OZ			2	100	33	0.66	0.0003	2.772	0.0014
S	Bead Sealer	8040P20056	64	OZ			4	100	98	3.9	0.002	16.38	0.0082
S	Blue Sealing Compound	9030010251692	250	CC	1.101	9.19	0.605	100	11.96	0.07	4E-05	0.294	0.0001
S	RTV Sealant	8030P66BR	79.9	OZ	1.05	8.77	5.24	100	10	0.52	0.0003	2.184	0.0011
S	Sealing Compound	564000F003678	50	LB			50	100	40.45	20.23	0.0101	84.966	0.0425

KEY
- A - Adhesives
- AF - Antifreeze
- CL - Cleaner/Solvents
- D - Degreasers
- FA - Fuel Additives
- G - Greases
- HF - Hydraulic Fliuds
- L - Lab
- LU - Lubricants
- M - Misc
- P - Paints/Thinners
- S - Sealants

Client: Malmstrom AFB	**Date:** 10/27/2000
Location: Base-wide	**Emissions:** 1999 Actual/Pot'l
Subject: Miscellaneous Chemical Usage - HAP emissions	**Calc by:** *NM/TLW*

Notes:

1. Miscellaneous Chemicals include Laboratory chemicals and general solvent chemicals used at Malmstrom AFB
2. HAP emissions were based on material balance: emissions were estimated to be equal to the number of pounds of HAP issued. Exceptions include glycol ethers where an emission factor of 5% was applied to account for the percentage expected to be emitted to air from anti-freeze. Chlorine was reduced by 99.5% to account for its reactivity within water treatment applications and due to the large usage of chlorine in recreational activities such as swimming pools.
HAPs generated from surface coating operations (I.e. MEK, Toluene, xylene, etc.) were adjusted to account for surface coating emissions already accounted for in "Surface Coatings" to avoid double reporting.
3. Pounds of HAP issued were supplied by Mr. Don Delorme (HAZMART) in inorganic and organic HAP reports for 1999 CY.
4. HAPs issued to organization 341st LSS LGLOM 230 HP were omitted as the products are used at remote missile facilities.

HAP	CAS	ACTUAL, lbs	ACTUAL, tons	POTENTIAL, lbs	POTENTIAL, tons
Acetaldehyde	75-07-0	7.00E-04	3.50E-07	2.94E-03	1.47E-06
Acetonitrile	75-05-8	0.10	4.83E-05	0.41	2.03E-04
Acrylic Acid	79-10-7	0.19	9.51E-05	0.80	3.99E-04
Acrylonitrile	107-13-1	2.83	1.41E-03	11.87	5.94E-03
Aniline	62-53-3	3.10E-03	1.55E-06	1.30E-02	6.51E-06
Antimony Trioxide	1309-64-4	1.14	5.72E-04	4.80	2.40E-03
Antimony	7440-36-0	0.28	1.41E-04	1.18	5.90E-04
Antimony, Tris[Bis(2-Ethylhexyl) Carbamodithioa	15991-76-1	0.24	1.18E-04	0.99	4.94E-04
Arsenic	7440-38-2	9.00E-04	4.50E-07	3.78E-03	1.89E-06
Asbestos	1332-21-4	0	0	0	0
Benzene	71-43-2	0	0	0	0
Bis(2-ethylhexyl)phthalate	117-81-7	0.57	2.85E-04	2.39	1.19E-03
Cadmium	7440-43-9	176.04	8.80E-02	739.39	3.70E-01
Calcium Dichromate (VI)	14307-33-6	0.79	3.94E-04	3.31	1.65E-03
Chlorine	7782-50-5	33.00	1.65E-02	138.60	6.93E-02
Chromic Acid	7738-94-5	0.03	1.67E-05	0.14	7.01E-05
Chromium	7440-47-3	0	0	0	0
Cobalt	7440-48-4	0.02	1.02E-05	0.09	4.26E-05
Colbaltous Sulfate	10124-43-3	0.01	6.60E-06	0.06	2.77E-05
Dibutyl Phthalate	84-74-2	0.39	1.95E-04	1.64	8.19E-04
Dichloromethane	75-09-2	19.76	9.88E-03	83.00	4.15E-02
Dimethylformamide	68-12-2	0.25	1.24E-04	1.04	5.21E-04
Ethylbenzene	100-41-4	31.60	1.58E-02	132.74	6.64E-02
Ethylene Glycol	107-21-1	168.81	8.44E-02	709.02	3.55E-01
Ethylene Oxide	75-21-8	1.00E-04	5.00E-08	4.20E-04	2.10E-07
Formaldehyde	50-00-0	1.10E-03	5.50E-07	4.62E-03	2.31E-06
Hexamethylene-1,6-Diisocyanate	822-06-0	2.03	1.02E-03	8.53	4.27E-03
Hexane	110-54-3	58.67	2.93E-02	246.42	1.23E-01
Hydrogen Fluoride	7664-39-3	0.01	5.50E-06	0.05	2.31E-05
Hydroquinone	123-31-9	0.25	1.25E-04	1.05	5.24E-04
Isophorone	78-59-1	1.88E-01	9.38E-05	0.79	3.94E-04
Lead Dioxide	1309-60-0	0.12	6.10E-05	0.51	2.56E-04
Lead Nitrate	10099-74-8	0.00	5.00E-08	0.00	2.10E-07
Lead Oxide Phophonate	12141-20-7	1.12	5.60E-04	4.70	2.35E-03
Lead	7439-92-1	1.73	8.65E-04	7.27	3.63E-03
Litharge	1317-36-8	0.01	3.50E-06	0.03	1.47E-05
Magnesium Chromate	13423-61-5	1.97	9.87E-04	8.29	4.15E-03
Manganese	7439-96-5	0.24	1.21E-04	1.02	5.09E-04
Manganese Dioxide	1313-13-9	26.31	1.32E-02	110.52	5.53E-02
MEK	78-93-3	372.48	1.86E-01	1,564.40	7.82E-01
Methanol	67-56-1	265.11	1.33E-01	1,113.45	5.57E-01
Methyl Chloroform	71-55-6	22.93	1.15E-02	96.31	4.82E-02
Methyl Diphenyl Diisocyanate	101-68-8	2.09	1.05E-03	8.79	4.40E-03
Methyl Isobutyl Ketone	108-10-1	26.13	1.31E-02	109.74	5.49E-02
Nickel	7440-02-0	0.05	2.59E-05	0.22	1.09E-04
Perchloroethylene	127-18-4	21.87	1.09E-02	91.84	4.59E-02
Phosphorus	7723-14-0	0.25	1.25E-04	1.05	5.25E-04
Potassium Cyanide	151-50-8	0.63	3.13E-04	2.63	1.31E-03
Potassium Zinc Chromate Hydroxide	11103-86-9	0.01	2.90E-06	0.02	1.22E-05
Sodium Arsenate	7784-46-5	0.00	5.00E-08	0.00	2.10E-07
Sodium Chromate	7775-11-3	0.50	2.50E-04	2.10	1.05E-03
Strontium Chromate	7789-06-2	6.50	3.25E-03	27.32	1.37E-02
Styrene	100-42-5	13.82	6.91E-03	58.05	2.90E-02
Toluene 2,4 Diisocyanate	584-84-9	0.12	6.02E-05	0.51	2.53E-04
Toluene	108-88-3	257.46	1.29E-01	1,081.35	5.41E-01
Trichloroethylene	79-01-6	4.44	2.22E-03	18.63	9.32E-03
Vinyl Acetate Monomer	108-05-4	0.10	5.18E-05	0.43	2.17E-04
Xylene (mixed)	1330-20-7	243.24	1.22E-01	1,021.60	5.11E-01
Zinc Chromate	13530-65-9	0.64	3.20E-04	2.68	1.34E-03
	Totals:	**1,767.08**	**0.88**	**7,421.75**	**3.71**

SECTION 16

OPEN DETONATION OF ENERGETIC MATERIALS

Source Description

MAFB performs open detonation of munitions during emergency disposal training activities. During the emergency disposal training activities, MAFB personnel detonate cartridges containing propellant, plastic explosives, and detonating cord. Explosives detonation at Air Force Bases are included in the two-digit SIC Code 97 for National Security and International Affairs. There are no appropriate SCC codes for detonation of munitions at Air Force Bases.

Actual Emissions

Detonation of Munitions (Ordnance): Data for calculating emissions from ordnance detonation were obtained from MAFB personnel who maintain records of each ordnance detonation event and the reactive constituents in each explosive. In the AEI Guidance Document, there are sections for both Detonation of Energetic Materials (Section 22) and Small Arms Firing (Section 27). Although Section 22 Detonation of Energetic Materials appears to be more appropriate for the emission estimates, emission factors for the materials used by MAFB are not included in the AEI Guidance Document. In addition, the quantities of explosive materials detonated at MAFB in 1999 are very small (less than 50 pounds of explosives). Therefore, the more general emission factors for CO and Pb compounds in Section 27 (AEI Guidance Document- Small Arms Firing) are used to estimate emissions. Based on this methodology, 1999 CO emissions are 5.79 lb/yr and lead compound emissions are 0.42 lb/yr.

Potential Emissions

Potential emissions from open detonation were estimated by multiplying by a scaling factor based on the ratio of potential operating hours (8,760 hours per year) to actual operating hours (2,080 hours in 1999) or a factor of 4.2. Based on this methodology, potential CO emissions are 24.3 lb/yr and lead compound emissions are 1.76 lb/yr.

References

1. Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations, Section 9, May 1999.

2. U.S. Environmental Protection Agency, Compilation of Air Pollutant Emission Factors – Volume I: Stationary Point Source (AP-42), Section 13.3, February 1980 (Reformatted January 1995).

3. U.S. Army Defense Ammunition Center, Munitions Items Disposition Action System (MIDAS), Central Library Version 74, 1 May 1998.

4. Methodology and Technology for Identifying and Quantifying Emission Products from Open Burning and Open Detonation Thermal Treatment Methods, Field Test Series A, B, and C, Volume 1 – Test Summary, January 1992.

Client:	Malmstrom AFB	**Date:**	8/16/00
Location:	Explosive Ordnance Disposal	**Emissions:**	Actual and Potential
Subject:	Emissions from EOD	**Calc by:**	*DDM*

Carbon monoxide (CO) and lead compounds are the main pollutants of concern from explosive ordnance detonation. Emissions will be calculated using the methodology described in the AEI guidance for Small Arms Firing.

CO emissions can be calculated by multiplying the number of rounds of ammunition fired or used times the amount of explosive material per round of ammunition and then times the emission factor of 77 lb CO per ton of ordnance exploded. Lead (Pb) compound emissions will be estimated, as suggested in the AEI guidance, by assuming all lead compounds (e.g., lead styphnate, lead azide, and lead thiocyanate) are released when the explosive is detonated.

The table estimating CO and Pb compound emissions for detonating each type of material is attached. CO emissions are calculated using the following formula:

Eco = NR * QP * (1/2000) *77

Where,
Eco = Emissions of carbon monoxide (lb/yr)
NR = Number of items of a particular type of ammunition or material detonated during 1999
QP = Quantity of explosive material per ordnance item, lb/item
1/2000 = Unit conversion factor (1 ton/2000 lb)
77 = CO emission factor (lb/ton). The units are pounds pollutant emitted per ton of ordnance

For example, the CO emissions for Demolition Charge, M112 (see Table) are calculated as follows:

CO Emissions = 81 items x 1.25 lbs explosive material/item x (1/2000) x 77 lb CO/ton explosive material

CO Emissions = 3.90 lb CO in 1999 from detonation of M112

From the attached table, total CO emissions = 5.79 lb/yr

Lead emissions are estimated assuming all the lead is released when the ordnance is fired as follows:

Epb = NR * Qpb * F/100

Epb = Emissions of lead (lb/yr)
NR = Number of items of a particular type of ammunition or material detonated during 1999
Qpb = Quantity of explosive material per ordnance item, lb/item
F = % lead compounds in the ordnance material

Client:	Malmstrom AFB	**Date:**	8/16/00
Location:	Explosive Ordnance Disposal	**Emissions:**	Actual and Potential
Subject:	Emissions from EOD	**Calc by:**	*DDM*

For example, the lead emissions for the M60 ignitor (37.5 % lead thiocyanate) are calculated as follows:

Lead Emissions = 104 items x 0.0001 lb/item x 37.5 % Pb cmpd /100

Lead (Pb) Emissons = 0.004 lb Pb in 1999 from detonation of the M60 ignitors

From the attached table, total Pb compound emissions = 0.42 lb/yr

Potential emissions from ordnance use would correlate with the potential operating hours.
A ratio of actual versus potential operating hours was used.
Actual hours = 2080 hrs Scaling Ratio = 4.2
Potential hours = 8760 hrs

Ordnance Potential CO or Pb emissions = Potential to 1999 ratio (4.2) x 1999 emissions

Ordnance Potential CO emissions = 4.2 x 5.79 lb/yr CO = 24.3 lb CO/yr	**24.3**	**lbs CO/yr**
	0.012	**tons CO/yr**
Ordnance Potential Pb compound emissions= 4.2 x 0.42 lb/yr Pb cmpd. =	**1.76**	**lbs Pb cpds/yr**
	0.0009	**tons Pb cpds/yr**

Client:	Malmstrom AFB	**Date:**	8/16/00
Location:	Explosive Ordnance Disposal	**Emissions:**	Actual and Potential
Subject:	Emissions from EOD	**Calc by:**	*DDM*

Carbon Monoxide (CO) and Lead (Pb) Compound Emissions from Explosive Ordnance Disposal (EOD)

Nomenclature	Reactive Constituents, Weight %	Quantity Explosive per Item, lb	Total Quantity, lb	CO Emission Factor, lb/ton	Lead Compounds, Weight %	CO Emissions, lb/yr	Lead Compound Emissions, lb/yr
Demolition charge, M112	RDX 91%, Plasticizer 9%	1.25	101.25	77	0	3.90	0
Blasting Cap, Non-electric M7	RDX 90%, Pb Azide 5%, Pb Styphnate	0.0027	0.30	77	10	0.01	0.030
Fuse, blasting time	Black Powder	0.0043 lb/ft	4.945	77	0	0.19	0
Detonating cord	PETN 100%	0.012 lb/ft	39.24	77	0	1.51	0
Cartridge, .50 caliber electric	Smokeless Powder 100%	0.002	0.00	77	0	0.0002	0
Blasting Cap, Electric M6	Pb Azide 100%	0.0028	0.39	77	100	0.01	0.39
M60 Ignitor	Pb Thiocyanate 37.5%, Potassium Chlorate 37.5%	0.0001	0.01	77	37.5	0.0004	0.004
TNT, 1 lb block	TNT 100%	0.02	0.16	77	0	0.01	0
Data Sheet M118	PETN 91%, plasticizer 9%	2	4	77	0	0.15	0
Ctg 12 gauge #00	Unknown	0.00413	9 rounds	77	0.36 gr/rnd	3.47E-06	4.63E-06
M1 Military Dynamite	M1 propellant - 85% nitrocellulose; 10% TNT; 5% dibutylphthalate; 1% duphenylamine; 1% potassium sulfate	0.0039	0.0234	77	0	0.001	0
					Totals (lb/yr):	**5.79**	**0.42**
					Totals (ton/yr):	**2.89E-03**	**2.10E-04**

SECTION 17

OZONE DEPLETING SUBSTANCES

Source Description

Two classes of Ozone Depleting Substances (ODSs) are used on base. Class I includes R-12, R-502, methyl chloroform and Freon 113. Class II includes HCFC-22, HCFC 141b, and HCFC-124.

ODSs primarily provide three services on base: 341st Transportation Squadron, Building 870, services vehicle air conditioning units; 341st CES, CEOFB, HVAC, located in Building 471 services base-wide air conditioning units and chillers; and a few processes use materials that contain small percentages of ODSs (solvents, lubricants, aerosol propellants, etc).

Actual Emissions

Actual emissions were estimated using a mass balance approach. Emissions were estimated to be equal to the amount of ODS charged to a system minus the amount that was taken out for disposal, recycle, or reclamation. Information for the three areas that use ODS came from two separate sources.

TSgt Baker (Building 471 HVAC) provided a Malmstrom AFB log of maintenance completed on base air conditioners/chillers in 1999. The log represented typical operations including the amount of services performed and quantity of material used. Each entry in the 1999 log lists the location where service was performed, the amount and type of refrigerant added, and the amount of refrigerant taken out. These values were used to perform emission estimates.

EMIS system records provided by Mr. Don Delorme (Hazmart) provided pounds of ODS issued in 1999 in miscellaneous products used base-wide. The EMIS database provided pounds of methyl chloroform, Freon 113, HCFC-22 and HCFC-141b issued as a component of miscellaneous solvents, lubricants, greases, etc. and as pure product. It was estimated that 100% of the products issued were used, and that 100% of the ODS was lost to the atmosphere.

Potential Emissions

Potential emissions for ozone depleting substance usage are considered to be equal to the actual emission rate in 1999 because of expected future reduction in ODC usage.

References

1. Title 40 Code of Federal Regulations Part 82 (40 CFR 82), "Protection of Stratospheric Ozone."

2. U.S. Environmental Protection Agency's Significant New Alternatives Policy (SNAP) Program.

3. Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations, Section 24, May 1999.

4. TSgt Baker, 341st CES, CEOFB, HVAC, located in Building 471.

5. Base EMIS database, Calendar Year 1999.

Client:	Malmstrom AFB	**Date:**	08/29/2000
Location:	Base Photolab and Graphics	**Emissions:**	Actual and Potential
Subject:	Emissions from Photographic Processing	**Calc by:**	*TLW/NM*

Basis:

1) Emissions of Pollutant = E_{ODS}
2) QP = Quantity (mass) of ODS-containing product used in the process (lb/yr)
3) QR = Quantity (mass) of ODS-containing product removed from the process (lb/yr)
4) WP = Weight percent of ODS in the product (%)
5) E_{ODS} (tpy) = (QP - QR) * (WP/100) * [1-(eff/100)] / 2000

Activity/ODS	Class	Quantity Used, lbs (QP)	Quantity Removed, lbs (QR)	Weight %ODS (WP)	Actual E_{ODS}, tpy	Potential E_{ODS}, tpy
Maintenance						
R12 (CFC-12)	I	0	195	100	-0.098	-0.098
R22 (HCFC-22)	II	1103.5	0	100	0.552	0.552
R502	I	5.5	216	100	-0.105	-0.105
New Installation						
HCFC-22	II	1.5	0	100	0.001	0.001
Miscellaneous Chemical Usage						
HCFC-22	II	15.900	--	Variable	0.008	0.008
HCFC-141b	II	61.601	--	Variable	0.031	0.031
methyl chloroform	I	26.015	--	Variable	0.013	0.013
Freon 113	I	1.885	--	Variable	0.001	0.001
				Totals:	**0.402**	**0.402**

1) Quantities of ODS used supplied by Sgt. Baker (HVAC) and Mr. Delorme (HAZMART) through maintenance logs and the EMIS database.

SECTION 18

PESTICIDE APPLICATION

Source Description

Pesticides are applied at MAFB by the Entomology Shop (Building 473) and by contracted personnel. Pesticide application at Air Force Bases is included in the two-digit SIC Code 97 for National Security and International Affairs. There is no appropriate SCC code for pesticide application.

Actual Emissions

Data for calculating emissions from pesticide application were obtained from MAFB personnel at the Entomology Shop and from contracted personnel. Actual emissions from pesticide application were estimated by multiplying the amount of pesticide used during 1999 by emission factors based on application method and active ingredient vapor pressures by the weight percents of active and inorganic ingredients obtained from the appropriate Material Safety Data Sheets (MSDS). Weight percents of VOC constituents could not be directly determined from the MSDSs. HAPs were not identified in the products.

The calculation table includes the calculation parameters and basis and the estimated emissions for 1999. Total VOCs from this activity at MAFB were 0.67 tpy from the pesticides applied by the Entomology Shop and contracted personnel. HAP emissions were 0 tpy.

Potential Emissions

Potential emissions from pesticide application at MAFB are related to the area of grass and plant areas that need to be treated. The land treated by pesticides is unlikely to increase; therefore potential emissions are equal to actual emissions.

References

1. U.S. Air Force Bioenvironmental Engineering Division, Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations, Brooks Air Force Base, TX 78235-5114, May 1999.

2. U.S. Environmental Protection Agency, Compilation of Air Pollutant Emission Factors – Volume I: Stationary Point and Area Sources (AP-42), Section 9.2.2, September 1995.

3. Emissions Inventory Improvement Program (EIIP), Volume III: Chapter 9, "Pesticides – Agricultural and Nonagricultural," December 1997.

4. Sgt. Coffman (Entomology, Building 473), Contractor

Client: Malmstrom AFB
Location: Base Wide Pesticide Application (Entomology and Contract)
Subject: Emissions from Pesticide Application

Date: 08/29/2000
Emissions: Actual and Potential
Calc by: *TLW/NM*

Basis:

Emissions from pesticide application are based on the approach described in the AEI Guidance Document, Section 25 Pesticide Application, for VOC emissions (weight percent VOC unknown). The primary pollutants of concern are VOC and organic HAP's.
The following table summarizes the material usage information provided by Sgt. Coffman (Entomology, Building 473) and contractors assigned to the base.
Material compositions were taken from information provided by Sgt. Coffman and MSDS sheets.

The following Calculations were used:

Evoc = Wpactive/100 * QP * 0.0005 *EF] + [WPinert/100 *QP * WPvocinert/100]

Evoc = Emissions of VOC (lb/yr)
WPactive = Weight % of active ingredient portion in pesticide (%)
QP = Quantity of pesticide applied (lbs/yr)
0.0005 = unit conversion factor (tons/lb)
EF = Emission factor (lb/ton) = pounds VOC emitted per ton of active ingredient applied; based on type of application and vapor pressure of ingredient.
WPinert = Weight % of inert portion of pesticide (%)
WPvocinert = Weight % VOC in the inert portion of the pesticide (%), based on formulation type

Pesticide Name	Stock Number	1999 Usage		Density (lb/gal)	QP (lbs/1999)	WPactive (%)	WPinert (%)	Formulation Type	WPvocinert (%), assumed	Evoc (inert), lbs/yr	Vapor Pressure	Application Method	EF (lb/ton)	Evoc (active), lbs/yr	Evoc-Actual, lbs/yr	Evoc-Potential, lbs/yr
									Entomology Herbicides							
Direx 80 DF	1812-362	15	lbs	--	15.00	80	20	granule	25	0.75	6.9E-08	Surface	700	4.2	4.95	4.95
Round-up	524-475	2	gal	9.77	19.54	41	59	solution/concentrate	21	2.42	Assume <1 x 10-4	Surface	700	2.80	5.22	5.22
Arsenal	241-346	5	gal	8.93	44.67	28.7	71.3	solution/concentrate	21	6.69	Assume <1 x 10-4	Surface	700	4.49	11.18	11.18
Oust	352-401	4	oz	12.19	0.38	75	25	dry flowable	28	0.03	Assume <1 x 10-4	Surface	700	0.10	0.13	0.13
									Entomology Insecticides							
Ramik Green	2393-185	130.5	lbs	--	130.50	1.005	98.995	pellet	27	34.88	Assume <1 x 10-4	na	700	0.46	35.34	35.34
Combat Super Bait	64240-2	96	each	0.58 lb/bait	6.96	0.03	99.97	solid	15	1.04	Assume <1 x 10-4	na	700	0.00	1.04	1.04
									Contractor Herbicides							
Round-up Pro	00228-00145	480	gal	9.77	4,689.36	41	59	solution/concentrate	21	581.01	Assume <1 x 10-4	Surface	700	672.92	1,253.93	1,253.93
2-4-D Amine	00524-00475	12.5	gal	9.69	121.08	47.3	0	solution/concentrate	21	0.00	8.0E-06	Surface	700	20.04	20.04	20.04
														Total (lbs)	1,331.84	1,331.84
														Total (tons)	0.67	0.67

SECTION 19

PHOTOGRAPHIC & LITHOGRAPHIC EQUIPMENT

Source Description

Photographic processing with chemicals is performed at the Base Photolab, located in Building 300. There is no lithographic operations or equipment at MAFB. Photographic equipment at Air Force Bases is included in the two-digit SIC Code 97 for National Security and International Affairs. There is no appropriate SCC code for photographic processing.

Actual Emissions

Data for calculating emissions from photographic processing were obtained from the MAFB EMIS database for 1999. It was assumed that usage of the chemical was equal to the amount of the chemical issued to the photo shop by the Hazmart in 1999, as recorded in the EMIS database. Actual emissions from photographic processing were estimated by multiplying the amount of each chemical used for photographic processing during 1999 by the weight percents of either VOC or specific HAP components obtained from the appropriate Material Safety Data Sheets (MSDS) or from the EMIS database.

The calculation table shows the photographic system used and the associated photographic processing component. HAP constituents, weight percent VOC and HAPs, and the estimated emissions for 1999 are also presented. Total VOCs from this activity at MAFB are 55.28 lb/yr (0.03 tpy) and total HAPs are 0 lb/yr.

Potential Emissions

Potential emissions from photographic processing would correlate with the potential increase in MAFB operating hours. The ratio of the potential operating hours (8,760) to actual operating hours in 1999 (2,080) is 4.21. Actual VOC and HAP emissions were multiplied by this ratio to calculate potential emissions. Potential VOC and HAP emissions are 232.8 lb/yr (0.12 tpy), and 0 lb/yr, respectively.

References

1. U.S. Air Force Bioenvironmental Engineering Division, Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations, Brooks Air Force Base, TX 78235-5114, May 1999.

2. MAFB EMIS database, calendar year 1999.

Client:	Malmstrom AFB	**Date:**	08/29/2000
Location:	Base Photolab and Graphics	**Emissions:**	Actual and Potential
Subject:	Emissions from Photographic Processing	**Calc by:**	*TLW/NM*

Emissions from photographic processing are based on the mass balance as described in the AEI Guidance Document, Section 20 Miscellaneous Chemical Use. The primary pollutants of concern are VOC and organic HAP's. The following table summarizes the material usage and product composition information provided in the EMIS database for Building 300, Base Photolab and Graphics and the estimated emissions of VOC and HAP.

Calculations were completed based on the following equations:

Emissions VOC - Actual (lbs/yr) = 1999 Material Usage (lb) x Specific Gravity x 8.35 lb/gal x Weight % VOC /100

Emissions VOC - Potential (lb/yr) = Emissions VOC - Actual (lb/yr) * 8,760 potential hours / 2,080 actual hours 1999

Volatile Organic Compound (VOC) and Hazardous Air Pollutant (HAP) Emissions from Photographic Processing

Component	NSN	1999 Usage		Specific Gravity	1999 Usage (lb)	Weight %VOC	Weight %HAP	HAP Constituents	Emissions VOC-Actual lb/yr	Emissions VOC-Pot. lb/yr
Reversal Bath and Replenisher	6750010410102	64	oz	1.01	4.22	0.00	0	none	0.00	0.00
Replenisher, Develop (color) 1	6750010418683	5	gal	1.19	49.68	0.00	0	none	0.00	0.00
Replenisher, Develop (color) 2	6750010418683	5	gal	1.08	0.35	25.00	0	none	0.09	0.37
Photographic Fixing Bath	6750010434671	128	oz	1.03	8.60	0.00	0	none	0.00	0.00
Photographic Replenisher, Develope	6750010434672	2	gal	1.05	17.54	10.00	0	none	1.75	7.38
Photographic Stabilizer	6750012851770	8	assume 1 gal	1.00	66.80	4.00	0	none	2.67	11.25
Replenisher, Develop	6750013204809	11	liter	1.04	18.38	3.00	0	none	0.55	2.32
Stabilizer, Replenisher	6750012306637	32	oz	1.02	2.13	0.10	0	none	0.00	0.01
Bleach, Fix-n-Replenish	6750013206638	53	gal	1.10	484.97	10.30	0	none	49.95	210.37
Photographic Developer	6750013282508	2	qt	1.23	5.14	0.00	0	none	0.00	0.00
Bleach, Photographic	6750013605171	20	liter	1.17	5.17	5.00	0	none	0.26	1.09
Photographic Fixing Bath	6750013765890	50	liter	1.11	49.04	0.00	0	none	0.00	0.00
Photographic Developer	6750013765892	60	liter	1.39	153.53	0.00	0	none	0.00	0.00
								Total VOC lb/yr	**55.28**	**232.80**
								Total VOC tn/yr	**0.03**	**0.12**

SECTION 20

SANITARY LANDFILL OPERATIONS

Source Description

Currently the MAFB has a private contractor to dispose of their domestic waste off-site to county-operated disposal facilities. Information provided by the MAFB personnel indicated the presence of two closed landfills onsite. These landfills were used for the disposal of domestic and industrial waste and also collected construction debris, wood residue, and leaves. Emissions considered in this source category are VOC and HAPs. Landfills are included in the two-digit SIC Code 49 Electric, Gas, and Sanitary Services. The SCC Code for these operations is Solid Waste Disposal, Commercial/Institutional, Landfill Dump, Municipal Fugitive Emissions – 5-02-006-02.

The following landfills are present at MAFB:

a. Flightline Landfill (LF), LF-1. The LF-1 is an inactive landfill located within the airfield clear zone on the northeast end of the primary runway at MAFB. The landfill covers approximately 22 acres and is bounded to the north and east by the base boundary fence, and to the southwest by perimeter road. The approximate size of the LF-1 is 19,166,400 ft^3. The LLF-1 landfill reportedly operated from 1942 to 1950. Material accepted for disposal included construction and industrial wastes which consisted of plating sludges, spent filtrates, paint products, petroleum products, and other unidentified materials. The landfill has been covered and revegetated.

b. Weapons Storage Area, LF-2. The LF-2 is an inactive landfill located on the northeast side of MAFB, approximately 600 ft northeast of the Weapons Storage Area. The landfill site covers approximately 30.5 acres and is bounded to the north by the MAFB perimeter fence and to the west by an unnamed coulee. The approximate size of the LF-2 is 22,215,600 ft^3. There are ten waste disposal trenches (approximately 20 feet wide and varying from 50 to 300 feet in length). The trenches are now covered and replanted with vegetation. The LF-2 reportedly operated from 1950 to 1991. Material accepted for disposal included coal fly ash, residual munitions, petroleum oils, and lubricants (POL)-contaminated soils, sanitary sewage sludges, and waste drums containing solvents, pesticides, oils, and acids. No records were available documenting the disposal method used at the LF-2.

Actual Emissions

Actual emissions were based on the AEI Guidance Document. Parameters for the landfill were obtained from the 1996 AEI performed by EarthTech.

The emissions were calculated assuming a first-order decomposition rate. The following is a sample calculation given: LF-1, landfill area of 22 acres; landfill volume of 19,166,400 ft^3; the number of years open as 9; and the number of years since closure as 48. The equation is:

$$Q_{CH4} = L_o R(e^{-kc} - e^{-kt})$$

Q_{CH4} = methane generation at t, m^3/yr
L_o = methane generation capacity, m^3 CH_4/Mg
R = average annual refuse acceptance rate during active life, Mg/yr
e = base log
k = methane generation constant, yr^{-1}
c = time since landfill closure (c=0 for active landfills)
t = time since the initial refuse placement

For nonmethane pollutants estimation:

$$Q_P = 1.82\ Q_{CH4} \times (C_P \times 10^{-6})$$

Q_P = pollutant emission rate, m^3, yr
C_P = pollutant concentration in landfill, ppmv
1.82 = multiplication factor assuming that 50 percent of the landfill gas is methane

To calculate uncontrolled mass emissions of each pollutant:

MW_P = Molecular weight pollutant
M_P = Pollutant mass emissions, kg/yr
T = temperature of landfill gas (25° C) (standard temperature)

Total VOC emissions were 12 tons per year. This includes several HAPs. The highest of which was toluene (0.87 tpy). Other HAPs are listed in the following calculations spreadsheet.

Potential Emissions

Based on the AEI Guidance Document potential emissions equals actual emissions. As the waste degrades, less pollutants will be emitted. Therefore, the current year represents maximum emissions.

References:

1. U.S. Environmental Protection Agency, *Compilation of Air Pollution Emission Factors – Volume I* (AP-42), 5th Edition with supplements A & B, Office of Air Quality Planning and Standards, Research Triangle Park, NC, November 1996.

2. Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations, Section 19, May 1999.

3. Landfill Air Emissions Estimation Model, Version 1.1, U.S. Environmental Protection Agency, September 1997.

4. Air Emissions Assessment Report Title V Air Emissions Inventory for 1996, Malmstrom Air Force Base, Montana, Earth Tech, April 1998.

Client:	Malmstrom AFB	**Date:**	8/24/00
Location:	Malmstrom AFB	**Emissions:**	Actual and Potential
Subject:	Landfills	**Calc by:**	*SBH*

Emissions Calculation Equation from AEI Guidance Document

$Q_{CH4} = L_0 R (e^{-kc} - e^{-kt})$

$Q_{NMOC} = 1.82 Q_{CH4} \times (C_{NMOC} \times 10^{-6})$

$M_P = Q_P \times (MW_P \times 1 \text{ atm}) / ((0.00008205 \text{ atm/gmolOK}) \times (1000 \text{ g/Kg}) \times (273 + T^{o}K))$

Definition	**Value** LF-1	**Value** LF-2	**Basis**
Q_{CH4} = methane generation at time t, m^3/yr	Calculated below		
L_0 = methane generation capacity, m^3 CH4/Mg	100	100	AEI Guidance
R = average annual refuse acceptance rate during active life, Mg/yr	37,707	9,594	=landfill capacity, ft3 x density lb/ft3 454 g/lb /1e6 /years operational
Total volume of landfill, ft^3	19,166,400	22,215,600	AFB data -From 1996 AEI (Earth Tech)
Number of years the landfill was operational	9	41	AFB data -From 1996 AEI (Earth Tech)
Density of landfill debris, lb/ft^3	39	39	Default value in LandGEM (625 Kg/m3)
e = base log	-	-	
k = methane generation constant, yr^{-1}	0.02	0.02	AEI Guidance
c = time since landfill closure (c=0 for active landfills)	48	8	AFB data -From 1996 AEI (Earth Tech)
t = time since initial refuse placement	57	49	AFB data -From 1996 AEI (Earth Tech)
Q_P = Pollutant emission rate, m3/yr	Calculated		
C_P = Pollutant concentration in landfill, ppmv	2420	2420	AEI Guidance
1.82 = muliplication factor assuming that 50% of the landfill gas is methane	-	-	
MW_P = Molecular weight of pollutant	See Below		
M_P = Pollutant mass emissions, kg/yr	Calculated below		
T = temperature of landfill gas (25°C)(standard temperature)	25	25	Standard default
Q_{CH4} =	237,831	457,468	

Concentrations and Molecular Weights are from AEI Guidance Manual
Potential Emissions = Actual Emissions based on the AEI Guidance Manual

Client:	Malmstrom AFB	**Date:**	8/24/00
Location:	Malmstrom AFB	**Emissions:**	Actual and Potential
Subject:	Landfills	**Calc by:**	*SBH*

Pollutant	MW	Concentration ppmv	Q_P (m^3/yr)		Potential and Actual Emissions (kg/yr)		Potential and Actual Emissions (lb/yr)		Potential and Actual Emissions Total (lb/yr)	Potential and Actual Emissions Total (tpy)
			LF-1	LF-2	LF-1	LF-2	LF-1	LF-2		
Total VOC (NMOC)	86.17	2420	1,048	2,015	3,692	7,101	8,131	15,641	23,772	12
HAPs										
Acrylonitrile	53.06	6.33	3	5	6	11	13.10	25.19	38.29	0.02
Benzene	78.11	11.1	5	9	15	30	33.81	65.03	98.84	0.05
Carbon Disulfide	76.13	0.58	0.3	0.5	0.8	1.5	1.72	3.31	5.03	0.003
Carbon Tetrachloride	153.84	0.004	0.002	0.003	0.011	0.021	0.02	0.05	0.07	0.00004
Carbonyl Sulfide	60.07	0.49	0.2	0.4	0.5	1.0	1.15	2.21	3.36	0.002
Chlorobenzene	112.56	0.25	0.1	0.2	0.5	1.0	1.10	2.11	3.21	0.002
Chloroethane	64.52	1.25	0.5	1.0	1.4	2.7	3.14	6.05	9.19	0.005
Chloroform	119.39	0.03	0.01	0.02	0.1	0.1	0.14	0.27	0.41	0.0002
Dichlorobenzene	147	0.21	0.1	0.2	0.5	1.1	1.20	2.32	3.52	0.002
1,1 Dichloroethene	98.95	2.35	1.0	2.0	4.1	7.9	9.07	17.44	26.51	0.01
1,1 Dichloroethane	96.94	0.2	0.1	0.2	0.3	0.7	0.76	1.45	2.21	0.001
1,2 Dichloroethane	98.96	0.41	0.2	0.3	0.7	1.4	1.58	3.04	4.63	0.002
Dichloromethane	84.94	14.3	6.2	12	22	41	47.36	91.10	138.47	0.07
1,2 Dichloropropane	112.98	0.18	0.1	0.1	0.4	0.7	0.79	1.53	2.32	0.001
Ethylbenzene	106.16	4.61	2.0	3.8	9	17	19.08	36.71	55.79	0.03
Hexane	86.18	6.57	2.8	5.5	10	19	22.08	42.47	64.55	0.03
Mercury (total)	200.61	2.92E-04	0.0001	0.0002	0.0010	0.0020	0.00	0.00	0.01	0.000003
Methyl ethyl ketone	72.11	7.09	3.1	5.9	9.1	17	19.94	38.35	58.28	0.03
Methyl isobutyl ketone	100.16	1.87	0.8	1.6	3.3	6	7.30	14.05	21.35	0.01
Perchloroethylene	165.83	3.73	1.6	3.1	11	21	24.12	46.39	70.51	0.04
1,1,2,2 Tetrachloroethane	167.85	1.11	0.5	0.9	3	6	7.26	13.97	21.24	0.01
Toluene	92.13	165	71	137	269	518	592.75	1,140.16	1,732.91	0.87
1,1,1 Trichloroethane	133.42	0.48	0.2	0.4	1.1	2.2	2.50	4.80	7.30	0.004
Trichloroethylene	131.38	2.82	1.2	2.3	6.6	13	14.45	27.79	42.23	0.02
Vinyl chloride	62.5	7.34	3.2	6	8	16	17.89	34.41	52.30	0.03
Xylenes	106.16	12.1	5.2	10	23	44	50.09	96.34	146.43	0.07

SECTION 21

SHEET METAL SHOP OPERATIONS

Source Description

The Sheet Metal Shop located in Building 471 contains various metalworking and machining operations that have no add-on control equipment. This equipment includes a band saw, punch press, pipe threader, drill press, milling machine, plate sander, and two lathes. The band saw and plate sander operate with a water flooded surface which essentially eliminates any particulate emissions. Due to the nature of their operations, the punch press and drill press are assumed to have negligible emissions, also.

Emissions of concern include particulate matter and metallic HAP emissions resulting from the machining of carbon steel. The applicable two-digit SIC Code is 97 for National Security and International Affairs. The sheet metal shop operations fall under SCC Code 3-09-999-99, Fabricated Metal Products, Other Not Classified.

Actual Emissions

Metalworking/machining emissions are calculated using an emission factor. The emission factor was obtained from a test of a similar source at an industrial facility. Actual operating hours are used with the emission factor to yield the pounds of particulate emitted annually.

PM emissions = (No. of Units) * (EF) * (Op. Hrs)

Metallic HAPs were estimated assuming that most of the metal processed is carbon steel and that the particulate emitted from this equipment would have the same composition of the steel. Thus, the fraction of each HAP present in a representative formulation of carbon steel is multiplied by the particulate matter emissions to obtain metallic HAP emissions.

Potential Emissions

Potential emissions were calculated as discussed in Section 37.2 of the AEI Guidance Document. In essence, the sheet metal shop supports base operations. Therefore, because the current base operations were approximately 2,080 hours annually, this was scaled up by a factor of 4.2 to reach potential base operating hours of 8,760 annually. Actual emissions associated with the sheet metal shop were multiplied by 4.2 to obtain potential shop emissions.

References

1. Source test data from comparable source at an industrial facility.

2. U.S. Air Force Bioenvironmental Engineering Division, Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations, Brooks Air Force Base, TX 78235-5114, May 1999.

SECTION 22

SITE RESTORATION

Source Description

Site Restoration at Malmstrom Air Force Base is comprised of a bioventing system utilized to treat petroleum impacted soils. Based on a description of the system provided by Mr. Jim Hodges of the 341st CES/CEV, and a review of bioventing principles from an Ohio Environmental Protection Agency Website, it was concluded that VOCs and/or HAPs were not emitted from the bioventing system located at MAFB, as might be with a soil vapor extraction (SVE) system, as described in the AEI Guidance Document, Section 26. Although extraction/sparging wells may be used for bioventing, similar to soil vapor extraction (SVE), bioventing differs from SVE in one fundamental way. The objective is to induce only sufficient airflow to enhance natural biodegradation of the contaminants, not cause them to volatilize. While SVE removes constituents primarily through volatilization, bioventing systems promote biodegradation of constituents and minimize volatilization (generally by using lower air flow rates than for SVE). Therefore, for extraction systems, the need for a vapor treatment system is not necessary. For these reasons, actual and potential emission calculations were not completed for this source.

References

1. Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations, Section 26, May 1999.

2. Mr. Jim Hodges, 341st CES/CEV

3. http://www.epa.gov/swerust1/cat/biovent.htm

SECTION 23

SMALL ARMS FIRING

Source Description

Small arms firing is conducted on the MAFB Firing Range. A total of 626,119 rounds of various types were spent at the range in 1999. The attached table provides data on each type of round used at the range.

A bullet catcher (Action Target System Model #TC2) was installed at the beginning of 2000. Because this inventory covers operations as they were present during the year 1999, this was not factored into the actual or potential lead emissions but will affect future lead emission estimates.

Actual Emissions

Pollutants of concern from small arms firing are CO and Pb. Emission factors for detonation of smokeless powder were obtained from AP-42, Section 13.3, Explosives Detonation, Table 13.3-1 (Reference 1). The HAP emissions associated with small arms firing are from Pb.

The following sample calculation shows the method used to calculate pollutant emissions from small arm firing.

Type of Round:	5.56 mm ball
Potential No. of Rounds Fired:	341,237
Amount of Powder:	28.9 grains per round
Emission Factor:	77 lb/ton (CO)
Conversion Factor:	1 lb = 7,000 grains; 1 ton = 2,000 lb

Potential Emissions

Potential emissions from small air firing are scaled up by a ratio of 4.2 from correlating current base operating hours of 2,080 annually to 8,760 hours per year.

References

1. *Compilation of Air Pollution Emission Factors, Volume I: Stationary Point and Area Sources*, Fifth Edition, AP-42, Office of Air Quality Planning and Standards (OAQPS),

U.S. Environmental Protection Agency (EPA), Research Triangle Park (RTP), North Carolina, January 1995.

2. U.S. Air Force Bioenvironmental Engineering Division, Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installation, Brooks Air Force Base, TX 78235-5114, May 1999.

Client:	Malmstrom AFB	**Date:**	10/04/00
Location:	Range	**Emissions:**	Actual and Potential
Subject:	Small Arms Firing	**Calc. by:**	*SSR*

Basis:

1. Number of rounds of a particular type of ammunition fired during the yr (rounds/yr) — **NR**
2. Quantity of energetic material per round of ammunition (grains/round) — **QP**
3. Unit conversion factor (1 lb/7000 grains) — **1/7000**
4. Unit conversion factor (1 ton/2000 lbs) — **1/2000**
5. CO emission factor (lb/ton) (from AP-42) — **77**
6. Quantity of lead compounds contained in the ammunition (grains/round) — Q_{pb}
7. Control efficiency of filters (%) — **CE**
8. Emissions of carbon monoxide (lb/yr) — E_{co}
9. Emissions of lead (lb/yr) — E_{pb}

Carbon Monoxide Emission Calculation

$$E_{co} = NR * QP * (1/7000) * (1/2000) * 77$$

Lead Emission Calculation

$$E_{pb} = NR * Q_{pb} * (1/7000) * [1-(CE/100)]$$

Location	Types of Rounds	Number of Rounds Fired (1999)	Quantity of Energetic Material per Round, QP (grains/round)[1]	Quantity of Lead Compounds per Round, Q_{pb} (grains/round)[2]	Control Equipment Type	Control Efficiency, CE (%)	Actual CO Emissions, E_{co} (lb/yr)	Actual Pb Emissions, E_{pb} (lb/yr)	Potential CO Emissions, E_{co} (lb/yr)[3]	Potential Pb Emissions, E_{pb} (lb/yr)[3]
MAFB Range	5.56mm Ball	341,237	28.9	0.14	None[4]	0	54.24	6.8247	227.8	28.66
	5.56mm Ball & Tracer	33,835	53	0.14	None[4]	0	9.86	0.6767	41.4	2.842
	7.62mm Ball & Tracer	183,837	46.6	0.22	None[4]	0	47.12	5.7777	197.9	24.27
	9mm Ball	48,935	5.5	0.13	None[4]	0	1.48	0.9088	6.2	3.817
	12 Gauge	3,970	28.9	0.36	None[4]	0	0.63	0.2042	2.7	0.858
	40mm TP	6,580	5.6	1.05	None	0	0.20	0.9870	0.9	4.1
	40mm TP Linked	7,725	72.8	1.05	None	0	3.09	1.1588	13.0	4.9
						Totals	**116.63**	**16.54**	**489.83**	**69.46**

1-Values for 5.56mm, 9mm, 7.62mm, and 12 gauge are from Table 27-1 "Quantity of Energetic Material found in Specific Types of Small Arms Ammunition" in the AEI Guidance Document. Values for 5.56mm w/tracer, 40mm TP and 40mm TP Linked are per TSgt. James Frazier.

2-Values for 5.56mm, 9mm, 7.62mm, 12 gauge, and 40mm are from Table 27-2 "Quantity of Lead Compounds found in the Energetic Material of Specific Types of Small Arms Ammunition" in the AEI Guidance Document. The value for 40mm is assumed to be the more conservative quantity of the two listed in the guidance.

3-Potential emissions are equal to actual emissions scaled up by a ratio of 4.2 from correlating current base operating hours of 2,080 annually to 8,760 hours annually.

4-A bullet catcher (Action Target System Model #TC2) was installed at the beginning of 2000. This will effect future lead emissions from this source.

SECTION 24

SOLVENT CLEANING MACHINES

Source Description

A total of eighteen solvent batch cold cleaners were identified in sixteen locations Base-wide. The solvent cleaners are used to remove grease, oils lubricants, soils, etc., from various parts. Most of the degreasers are operated under contract with Safety-Kleen and use Safety-Kleen Premium Gold Solvent 150. There are two paint gun cleaning units that use Safety-Kleen Heavy Duty Lacquer Thinner 6782 and one immersion unit that use Safety-Kleen Immersion Cleaner. Emissions of VOCs and organic HAPs may occur from waste solvent evaporation, solvent carryout (evaporation from wet parts), solvent bath evaporation, spray evaporation, and agitation. In addition to the eighteen solvent cleaners, four aqueous cleaners are present with 3 being Chemfree Smart washers and one serviced by Safety-Kleen. The aqueous cleaners were not included in these calculations because emissions from the aqueous solvent are negligible. The applicable two-digit SIC Code is 97 National Security and International Affairs; the applicable SCC Code is 4-01-003-03, Cold Solvent Cleaning/Stripping Standard (Petroleum Solvent).

Actual Emission

Actual emissions were calculated using a mass balance approach as discussed in Section 28.2 of the AEI Guidance Document. In general, the amount of solvent emitted is approximately equal to the total amount of fresh solvent added to the cleaning machine (VA), minus the amount of waste solvent removed from the machine (VR). If a carbon adsorption unit or other form of exhaust control device is present, the captured quantity of solvent (VC) must be subtracted from this total. The volume of solvent emitted can be converted to the mass of solvent emitted by multiplying the volume times the density of the solvent (D). Emissions of applicable pollutants may then be calculated by multiplying the mass of solvent emitted by the weight fraction (weight percent, WP divided by 100) of the pollutant in the solvent. Therefore,

$$E_{pol} = [(VA - VR - VC) * D] * [WP/100]$$

Safety-Kleen provided the volume of solvent added to Base solvent cleaning machines (VA) and volume of solvent removed (VR) from the units they serviced in 1999 and MSDS sheets which reported density (D) and weight percentage of chemical constituents (WP). The MSDS indicated that Safety-Kleen Premium Gold Solvent is 100% petroleum distillates while the Immersion Cleaner and Heavy Duty Lacquer Thinner also contains HAPs. The machines are not equipped with exhaust control devices; therefore, VC is 0.

It should be noted that mass-balance calculations were performed for the individual machines in an attempt to delineate emissions. However, some emissions came out negative due to a larger

reported VR than VA. These emissions were set to zero. Additional calculations and summary of emissions are included in the attached calculation worksheet.

Potential Emission

Potential emissions were calculated as discussed in Section 37.2 of the AEI Guidance Document. In essence, solvent cleaning is a maintenance activity in support of base operations. Therefore, because the base operations were approximately 2,080 hours annually, this was scaled up by a factor of 4.2 to reach potential base operating hours of 8,760 annually.

Actual emissions associated with solvent cleaning were multiplied by a factor of 4.2 to obtain potential solvent cleaning emissions.

References

1. U.S. Environmental Protection Agency, Compilation of Air Pollutant Emission Factors – Volume I: Stationary Point and Area Sources (AP-42), Section 4.6, April 1981 (Reformatted January 1995).

2. Emission Inventory Improvement Program (EIIP) Volume III: Chapter 6, "Solvent Cleaning," September 1997.

3. U.S. Air Force Bioenvironmental Engineering Division, Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations, Brooks Air Force Base, TX 78235-5114, May 1999.

Client: Malmstrom AFB
Location: Base-Wide
Subject: Solvent Cleaning Machines

Date: 10/04/00
Emissions: Actual and Potential
Calc. by: SSR

Objective: Calculate emissions associated with solvent degreasing operations.

Variables:

1) Emissions of a particular pollutant (lb/yr) = E
2) Volume of solvent added to the tank during the year (gal/yr) = VA
3) Volume of solvent removed from the tank for disposal (gal/yr) = VR
4) Density of the solvent (lb/gal) = D
5) Weight percentage of pollutant in the solvent (%) = WP
6) Volume of solvent captured by carbon adsorber (gal/yr) = VC

Equations: $E = [(VA-VR-VC) * D] * [WP/100]$

Calculate Emissions:

Machine Type	Location	Solvent[a]	Constituent/CAS Number	WP	D (lb/gal)	VA[a] (gal/yr)	VR[b] (gal/yr)	VC (lb/yr)	E (lb/yr) - Actual	E (lb/yr) - Potential [c]
Hurri Washer	Bldg 200	Safety-Kleen Premium Gold Solvent	Distillates (petroleum), hydrotreated light (64742-47-8)	100	6.7	182	173	0	60.3	253.26
Safety Kleen	Bldg 320	Safety-Kleen Premium Gold Solvent	Distillates (petroleum), hydrotreated light (64742-47-8)	100	6.7	36	36	0	0	0
Safety Kleen	Bldg 407	Safety-Kleen Premium Gold Solvent	Distillates (petroleum), hydrotreated light (64742-47-8)	100	6.7	210	186	0	160.8	675.36
Hotsy	Bldg 450			100				0	0	0
Safety Kleen	Bldg 685	Safety-Kleen Premium Gold Solvent	Distillates (petroleum), hydrotreated light (64742-47-8)	100	6.7	50	56	0	0	0
Safety Kleen	Bldg 850	Safety-Kleen Premium Gold Solvent	Distillates (petroleum), hydrotreated light (64742-47-8)	100	6.7	36	36	0	0	0
Safety Kleen	Bldg 850	Immersion Cleaner	VOC	92	7.9	24	20	0	29.072	122.1024
			Dipropylene glycol monomethyl ether (34590-94-8)	13	7.9	24	20	0	4.11	17.25
			Naphthalene (91-20-3)	6	7.9	24	20	0	1.90	7.96
Safety Kleen	Bldg 870	Safety-Kleen Premium Gold Solvent	Distillates (petroleum), hydrotreated light (64742-47-8)	100	6.7	182	173	0	60.3	253.26
Safety Kleen	Bldg 870	Safety-Kleen Premium Gold Solvent	Distillates (petroleum), hydrotreated light (64742-47-8)	100	6.7	65	60	0	33.5	140.7
Safety Kleen	Bldg 882	Safety-Kleen Premium Gold Solvent	Distillates (petroleum), hydrotreated light (64742-47-8)	100	6.7	455	433	0	147.4	619.08
Hercules Paint Gun Cleaner [d]	Bldg 910	PPG DTL10	VOC	100	7.5	32	29	0	22.5	94.5
Safety Kleen	Bldg 910	Heavy Duty Lacquer Thinner 6782	VOC	100	6.9	35	35	0	0	0
			Toluene (108-88-3)	60	6.9	35	35	0	0	0
			Methyl ethyl ketone (78-93-3)	60	6.9	35	35	0	0	0
			Methyl isobutyl ketone (108-10-1)	60	6.9	35	35	0	0	0
			Ethylbenzene (100-41-4)	30	6.9	35	35	0	0	0
			Propylene glycol methyl ether acetate (108-65-6)	17	6.9	35	35	0	0	0
			Xylene (1330-20-7)	15	6.9	35	35	0	0	0
			1,1,1-trichloroethane (71-55-6)	1	6.9	35	35	0	0	0
			Methylene chloride (75-09-2)	1	6.9	35	35	0	0	0
			Perchloroethylene (127-18-4)	1	6.9	35	35	0	0	0
Safety Kleen	Bldg 1222	Safety-Kleen Premium Gold Solvent	Distillates (petroleum), hydrotreated light (64742-47-8)	100	6.7	34	28	0	40.2	168.84
Safety Kleen	Bldg 1440	Safety-Kleen Premium Gold Solvent	Distillates (petroleum), hydrotreated light (64742-47-8)	100	6.7	182	175	0	46.9	196.98
Safety Kleen	Bldg 1448	Safety-Kleen Premium Gold Solvent	Distillates (petroleum), hydrotreated light (64742-47-8)	100	6.7	182	175	0	46.9	196.98
Safety Kleen	Bldg 1450	Safety-Kleen Premium Gold Solvent	Distillates (petroleum), hydrotreated light (64742-47-8)	100	6.7	12	13	0	0	0
Safety Kleen	Bldg 3075	Heavy Duty Lacquer Thinner 6782	VOC	100	6.9	65	65	0	0	0
			Toluene (108-88-3)	60	6.9	65	65	0	0	0
			Methyl ethyl ketone (78-93-3)	60	6.9	65	65	0	0	0
			Methyl isobutyl ketone (108-10-1)	60	6.9	65	65	0	0	0
			Ethylbenzene (100-41-4)	30	6.9	65	65	0	0	0
			Propylene glycol methyl ether acetate (108-65-6)	17	6.9	65	65	0	0	0
			Xylene (1330-20-7)	15	6.9	65	65	0	0	0
			1,1,1-trichloroethane (71-55-6)	1	6.9	65	65	0	0	0
			Methylene chloride (75-09-2)	1	6.9	65	65	0	0	0
			Perchloroethylene (127-18-4)	1	6.9	65	65	0	0	0
Safety Kleen	Bldg 82110	Safety-Kleen Premium Gold Solvent	Distillates (petroleum), hydrotreated light (64742-47-8)	100	6.7	51	48	0	20.1	84.42
								Total VOC (lb/yr):	668.0	2805.5
								Total VOC (ton/yr):	0.33	1.40
								Total HAPs (lb/yr)	6.00	25.22

(a) - Information on Safety Kleen units supplied by Troy Morris of Safety Kleen
(b) - Information on Safety Kleen units supplied by Troy Morris of Safety Kleen
(c) - Actual emissions associated with solvent cleaning were multiplied by a factor of 4.2 to obtain potential solvent cleaning emissions. 4.2 is the ratio between current base operating hours of 2080 annually to 8760 hours per year.
(d) - PPG DTL10 is assumed to have a specific gravity of 0.9. The quantity added is from the Hazmart database. This is used once a year to clean out the gun, therefore since no quantity removed was available a 10% loss was assumed.

Individual HAPs (lbs/yr)

Dipropylene glycol monomethyl ether	4.11	17.25
Naphthalene	1.90	7.96
Toluene	0	0
Methyl ethyl ketone	0	0
Methyl isobutyl ketone	0	0
Ethylbenzene	0	0
Propylene glycol methyl ether acetate	0	0
Xylene	0	0
1,1,1-trichloroethane	0	0
Methylene chloride	0	0
Perchloroethylene	0	0

SECTION 25

STATIONARY INTERNAL COMBUSTION EQUIPMENT

Source Description

Stationary Internal Combustion Engines at Malmstrom AFB consist primarily of emergency generators and pumps. These engines are all reciprocating internal combustion engines that burn diesel fuel. These units are found in various locations on the Base. One internal combustion engine is present at the compressed natural gas system (Building 144). The unit drives the two natural gas compressors and burns natural gas.

All of the units are included in the two-digit SIC Code 97 for National Security and International Affairs. The SCC that best describes this emission category is reciprocating engines, distillate oil 2-02-001-02, 2-03-001-01, and 2-02-004-01.

Actual Emissions

Generators - Actual emissions were estimated using rated power output, the loading factor, and the operating time for each piece of equipment along with emission factors for each specific pollutant.

All data was obtained in from Mr. Dave Heckler. This data included the name and location of each generator as well as the maximum load, actual load, and operating hours in 1999. Mr. Jim Chestnutt reviewed and approved the list of generators. Emission factors for all engines that have a maximum load less than 600 horsepower were obtained from Table 29-3, "Emission Factors for Uncontrolled Small Diesel Internal Combustion Engines (≤ 600 hp)" in the AEI Guidance Document. Emission factors for the five generators with a maximum load greater than 600 horsepower were taken from Table 3.4-1, "Gaseous Emission Factors for Large Stationary Diesel and All Stationary Dual Fuel Engines" and 3.4-5, "Particulate and Particle Sizing Emission Factors for Large Stationary Diesel Engines" in AP-42. Hazardous air pollutant factors for the five generators were taken from Tables 3.4-3 "Speciated Organic Compound Emission Factors for Large Stationary Diesel Engines," and Table 3.4-4 "Polycyclic Aromatic Hydrocarbon Emission Factors for Large Stationary Diesel Engines."

CNG Engine – Actual emissions were estimated using Table 29-6, "Emission Factors for Uncontrolled Natural Gas Engines". Engine operating data was obtained from Sgt Schafer, 341st CES, Fuels.

Potential Emissions

Generators - Potential emissions were estimated using guidance provided by the U.S. EPA. The guidance document titled "Calculating Potential to Emit (PTE) for Emergency Generators"

allows emergency generators to limit their potential to emit to 500 hours per year. This guidance was applied to all generators.

CNG Engine - Potential emissions were calculated based on the ratio of the potential number of operating hours (8,760 hours) to the actual number of operating hours in 1999 (2,080 hours). This results in a ratio of 4.2. Potential emissions were estimated by multiplying the actual emissions for VOCs and HAPs by 4.2.

References

1. U.S. Environmental Protection Agency, Compilation of Air Pollutant Emission Factors – Volume I: Stationary Point and Area Sources (AP-42), Chapter 3, October 1996.

2. U.S. Environmental Protection Agency, Factor Information Retrieval System (FIRE), Version 5.1B, December 1996.

3. U.S. Environmental Protection Agency, VOC / PM Speciation Data System (SPECIATE), Version 1.5, October 1992.

4. U.S. Environmental Protection Agency, Emission Factor Documentation for AP-42 Section 3.3, Gasoline and Diesel Industrial Engines, April 1993.

5. U.S. Environmental Protection Agency, Office of Mobile Sources, Average Life, Annual Activity, and Load Factor Value for Nonroad Engine Emissions Modeling, Report No. NR-005, December 1997.

6. Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations, Section 9, May 1999.

Client:	Malmstrom AFB	**Date:**	8/15/00
Location:	Base-wide	**Emissions:**	Actual
Subject:	Stationary Internal Combustion	**Calc by:**	*DDM*

Parameter	Quantity	Units	Basis
1. Emission Factors (Diesel Reciprocating up to 600 hp)			
PM/PM_{10}	2.2	$lb/10^3$ hp-hr	Table 29-3, AEI Guidance Document
NO_x	31	$lb/10^3$ hp-hr	Table 29-3, AEI Guidance Document
SO_x	2.05	$lb/10^3$ hp-hr	Table 29-3, AEI Guidance Document
CO	6.68	$lb/10^3$ hp-hr	Table 29-3, AEI Guidance Document
VOC	2.5	$lb/10^3$ hp-hr	Table 29-3, AEI Guidance Document
Acetaldehyde	0.0054	$lb/10^3$ hp-hr	Table 29-3, AEI Guidance Document
Acrolein	0.000648	$lb/10^3$ hp-hr	Table 29-3, AEI Guidance Document
Benzene	0.0065	$lb/10^3$ hp-hr	Table 29-3, AEI Guidance Document
1,3-Butadiene	0.000274	$lb/10^3$ hp-hr	Table 29-3, AEI Guidance Document
Formaldehyde	0.0083	$lb/10^3$ hp-hr	Table 29-3, AEI Guidance Document
Naphthalene	0.000594	$lb/10^3$ hp-hr	Table 29-3, AEI Guidance Document
Polycyclic Aromatic Hydrocarbons	0.0012	$lb/10^3$ hp-hr	Table 29-3, AEI Guidance Document
Toluene	0.0029	$lb/10^3$ hp-hr	Table 29-3, AEI Guidance Document
Xylenes	0.002	$lb/10^3$ hp-hr	Table 29-3, AEI Guidance Document
Propylene	0.0181	$lb/10^3$ hp-hr	Table 3.3-3 AP-42 (converted to output units)
Fluorene	0.000204	$lb/10^3$ hp-hr	Table 3.3-3 AP-42 (converted to output units)
Anthracene	0.0000131	$lb/10^3$ hp-hr	Table 3.3-3 AP-42 (converted to output units)
2. Emission Factors (Diesel Reciprocating greater than 600 hp)			
PM	0.2426	grams/hp-hr	Table 3.4-5, AP-42
PM_{10}	0.1578	grams/hp-hr	Table 3.4-5, AP-42
NO_x	11	grams/hp-hr	Table 3.4-1, AP-42
SO_x	2.05	grams/hp-hr	Table 3.4-1, AP-42
CO	2.4	grams/hp-hr	Table 3.4-1, AP-42
VOC	0.33	grams/hp-hr	Table 3.4-1, AP-42
Acetaldehyde	0.000176	$lb/10^3$ hp-hr	Table 3.4-3, AP-42 (converted to output units)
Acrolein	0.00006	$lb/10^3$ hp-hr	Table 3.4-3, AP-42 (converted to output units)
Benzene	0.00543	$lb/10^3$ hp-hr	Table 3.4-3, AP-42 (converted to output units)
Formaldehyde	0.0005523	$lb/10^3$ hp-hr	Table 3.4-3, AP-42 (converted to output units)
Naphthalene	0.00091	$lb/10^3$ hp-hr	Table 3.4-4, AP-42 (converted to output units)
Polycyclic Aromatic Hydrocarbons	0.001484	$lb/10^3$ hp-hr	Table 3.4-4, AP-42 (converted to output units)
Toluene	0.001967	$lb/10^3$ hp-hr	Table 3.4-3, AP-42 (converted to output units)
Xylenes	0.00135	$lb/10^3$ hp-hr	Table 3.4-3, AP-42 (converted to output units)
Propylene	0.01953	$lb/10^3$ hp-hr	Table 3.4-3, AP-42 (converted to output units)
Fluorene	0.00009	$lb/10^3$ hp-hr	Table 3.4-4, AP-42 (converted to output units)
Anthracene	0.00001	$lb/10^3$ hp-hr	Table 3.4-4, AP-42 (converted to output units)

Client:	Malmstrom AFB	**Date:**	09/06/2000
Location:	Base-wide	**Emissions:**	Actual
Subject:	Stationary Internal Combustion	**Calc by:**	*DDM*

DIESEL-FIRED (Up to 447 kW or 600 hp)

Serial #	Model #	Manufacturer	Building	Rated power output, kW	Actual Load, kW	% of Maximum Power	Rated power output, hp	1999 Operating Time, Hours
2WOBO1694	3406DI	Caterpillar	144	250	150	60%	335	27.1
85Z01446	3406DI	Caterpillar	152	175	100	57%	235	10.5
66D48062	3306PC	Caterpillar	160	155	85	55%	208	25
1111754	5.0EGHEB	Onan	200	5	3	60%	7	65
82533M	TP-5A4-DC	Over-Lowe	200	6	4	67%	8	17
F880130499	15-RDJC	Onan	200	15	10	67%	20	13.1
H900340891	15-RDJC	Onan	200	15	10	67%	20	29.4
341188	S20D18	US Motors	200	20	10	50%	27	15.3
KZ04269	MEP-005A	Hollingsworth	200	30	25	83%	40	26.1
FZ03234	MEP-006A	Fermont	200	60	45	75%	80	14.5
BW00119	MEP-007B	Foster Ent.	200	100	75	75%	134	15
BW00183	MEP-007B	Foster Ent.	200	100	75	75%	134	14.5
BW00187	MEP-007B	Foster Ent.	200	100	75	75%	134	16.8
KZ00091	MEP-009B	Hollingsworth	200	200	175	88%	268	17.8
KZ00099	MEP-009B	Hollingsworth	200	200	175	88%	268	14.2
E920470279	100DGBD	Onan	249	100	35	35%	134	2.4
763412	SD020	Generac	294	15	8	53%	20	38.9
D980729992	100DGDB	Onan	3348	100	75	75%	134	24.7
B60573	DMT-60C3	DMT	407	60	25	42%	80	25.9
E910391396	30DGAD	Onan	429	30	12	40%	40	16.5
F880130500	15-RDJC	Onan	496	15	10	67%	20	22
L870951713	20.0DL4	Onan	530	20	15	75%	27	16.1
F820624909	30.0ODDA-15R	Onan	771	30	20	67%	40	21.7
H900340892	15.ORDJC	Onan	910	15	5	33%	20	29.4
J882139997	NTA-855-G52	Cummins	1075	300	225	75%	402	4
220030	6CT8.3GC	Cummins	1082	125	65	52%	168	13.6
860984	88A01093-6	Generac	1320	20	9	45%	27	12.7
234660	4BT3.9G2	Cummins	1408	60	35	58%	80	20.6
D3781A/001	D100P1/001	Olympian	1439	100	65	65%	134	24.5
A920445325	100DGDB	Onan	1440	100	85	85%	134	19.3
811147	175DGFB	Onan	1839	100	100	100%	134	43.7
F820624909	30.0DDA	Onan	1879	30	15	50%	40	27.9
G93051468	35EGBB	Onan	1881	35	16	46%	47	245.7
K9600622834	100DGDB	Onan	1848	100	55	55%	134	29.4
30305858	NT855652	Cummins	1884	200	75	38%	268	1
1950585433	100DGDB	Onan	1996	100	60	60%	134	12.7
A960597151	125-DGEA	Onan	3080	125	85	68%	168	24.2
85B781	D330	Caterpillar	P00	75	45	60%	101	26.3
85B898	D330	Caterpillar	Q00	75	45	60%	101	17.3
85B866	D330	Caterpillar	R00	75	45	60%	101	60.9
85B888	D330	Caterpillar	S00	75	45	60%	101	27.9
85B1033	D330	Caterpillar	T00	75	45	60%	101	40.9
11475968	NT-855-F3	Cummins	1459	PUMP*	20 gal/hr	-	-	13.1
11479673	NT-855-F3	Cummins	1459	PUMP*	20 gal/hr	-	-	13.7
11475970	NT-855-F3	Cummins	1459	PUMP*	20 gal/hr	-	-	13.3

*For pumps: 20 gallons/hr x 54,975 hP-hr/gal x Y hours per year = hP-hr/yr x EF

Client: Malmstrom AFB
Location: Base-wide
Subject: Stationary Internal Combustion

Date: 09/06/2000
Emissions: Actual
Calc by: *DDM*

DIESEL-FIRED (Greater than 447 kW or 600 hp)

G880140225	VTA28-GS2	Caterpillar	500	500	260	52%	671	45
A930497772	500DFFB	Onan	1482	500	295	59%	671	37
99291	VTA-1710-GS2	Cummins	1831	510	375	74%	684	37
81208007	3412	Caterpillar	2040	500	385	77%	671	37
RU190Y8	VHP5900DSI	Waukesha	82110	940	650	69%	1261	76

Equation for generators

E_{pol} = [PO * (LF/100) * OT]/1000 * EF

E_{pol} = Emissions of a particular pollutant (lb/yr)
PO = Rated power output of engine (hp)
LF = Loading Factor (% of maximum power)
OT = Operating time of the engine (hr)
1000 = Factor for converting "hp-hr" to "10^3 hp-hr"
EF = Emission Factor (lb/10^3 hp-hr)

Client:	Malmstrom AFB	**Date:**	09/06/2000
Location:	Base-wide	**Emissions:**	Actual
Subject:	Stationary Internal Combustion	**Calc by:**	*DDM*

Criteria Pollutant Emissions

	Tons per Year				
Serial #	PM/PM_{10}	NO_x	SO_x	CO	VOC
2WOBO1694	0.01	0.08	0.01	0.02	0.01
85Z01446	0.002	0.02	0.001	0.005	0.002
66D48062	0.003	0.04	0.0029	0.01	0.0036
1111754	0.0003	0.004	0.0003	0.001	0.0003
82533M	0.0001	0.001	0.0001	0.0003	0.0001
F880130499	0.0002	0.003	0.0002	0.001	0.0002
H900340891	0.0004	0.01	0.0004	0.001	0.0005
341188	0.0002	0.003	0.0002	0.001	0.0003
KZ04269	0.001	0.01	0.001	0.003	0.001
FZ03234	0.001	0.01	0.001	0.003	0.001
BW00119	0.002	0.02	0.002	0.005	0.002
BW00183	0.002	0.02	0.001	0.005	0.002
BW00187	0.002	0.03	0.002	0.01	0.002
KZ00091	0.005	0.06	0.004	0.01	0.01
KZ00099	0.004	0.05	0.003	0.01	0.004
E920470279	0.0001	0.002	0.0001	0.0004	0.0001
763412	0.0005	0.01	0.000	0.001	0.001
D980729992	0.003	0.04	0.003	0.008	0.003
B60573	0.001	0.01	0.001	0.003	0.001
E910391396	0.0003	0.004	0.0003	0.001	0.0003
F880130500	0.0003	0.005	0.0003	0.001	0.0004
L870951713	0.0004	0.01	0.0003	0.001	0.0004
F820624909	0.001	0.01	0.001	0.002	0.001
H900340892	0.0002	0.0031	0.0002	0.001	0.0002
J882139997	0.001	0.02	0.001	0.004	0.002
220030	0.001	0.02	0.001	0.004	0.001
860984	0.0002	0.0024	0.0002	0.001	0.0002
234660	0.001	0.01	0.001	0.003	0.001
D3781A/001	0.002	0.03	0.002	0.01	0.003
A920445325	0.002	0.03	0.002	0.01	0.003
811147	0.01	0.09	0.01	0.02	0.01
F820624909	0.001	0.01	0.001	0.002	0.001
G93051468	0.01	0.08	0.01	0.02	0.01
K9600622834	0.002	0.03	0.002	0.01	0.003
30305858	0.0001	0.0016	0.0001	0.0003	0.0001
1950585433	0.001	0.02	0.001	0.003	0.001
A960597151	0.003	0.04	0.003	0.01	0.003
85B781	0.002	0.02	0.002	0.01	0.002
85B898	0.001	0.02	0.001	0.003	0.001
85B866	0.004	0.06	0.004	0.01	0.005
85B888	0.002	0.03	0.002	0.01	0.002
85B1033	0.003	0.04	0.003	0.01	0.003
11475968	0.016	0.223	0.015	0.048	0.018
11479673	0.017	0.233	0.015	0.050	0.019
11475970	0.016	0.227	0.015	0.049	0.018

	Tons per Year					
	PM	PM_{10}	NO_x	SO_x	CO	VOC
G880140225	0.004	0.003	0.190	0.035	0.042	0.006
A930497772	0.004	0.003	0.177	0.033	0.039	0.005
99291	0.005	0.003	0.226	0.042	0.049	0.007
81208007	0.005	0.003	0.232	0.043	0.051	0.007
RU190Y8	0.018	0.012	0.803	0.150	0.175	0.024

	Tons per Year					
	PM	PM_{10}	NO_x	SO_x	CO	VOC
Total	0.16	0.14	3.34	0.42	0.72	0.19

Client:	Malmstrom AFB	**Date:**	09/06/2000
Location:	Base-wide	**Emissions:**	Actual
Subject:	Stationary Internal Combustion	**Calc by:**	*DDM*

Hazardous Air Pollutant Emissions

	HAPs Tons per Year								
Serial Number	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Formaldehyde	Naphthalene	Polycyclic Aromatic Hydrocarbons	Toluene	Xylenes
2WOBO1694	1.47E-05	1.77E-06	1.77E-05	7.47E-07	2.26E-05	1.62E-06	3.27E-06	7.90E-06	5.45E-06
85Z01446	3.80E-06	4.56E-07	4.58E-06	1.93E-07	5.84E-06	4.18E-07	8.45E-07	2.04E-06	1.41E-06
66D48062	7.69E-06	9.23E-07	9.26E-06	3.90E-07	1.18E-05	8.46E-07	1.71E-06	4.13E-06	2.85E-06
1111754	7.06E-07	8.47E-08	8.50E-07	3.58E-08	1.09E-06	7.77E-08	1.57E-07	3.79E-07	2.61E-07
82533M	2.46E-07	2.95E-08	2.96E-07	1.25E-08	3.78E-07	2.71E-08	5.47E-08	1.32E-07	9.12E-08
F880130499	4.74E-07	5.69E-08	5.71E-07	2.41E-08	7.29E-07	5.22E-08	1.05E-07	2.55E-07	1.76E-07
H900340891	1.06E-06	1.28E-07	1.28E-06	5.40E-08	1.64E-06	1.17E-07	2.37E-07	5.72E-07	3.94E-07
341188	5.54E-07	6.65E-08	6.67E-07	2.81E-08	8.51E-07	6.09E-08	1.23E-07	2.98E-07	2.05E-07
KZ04269	2.36E-06	2.84E-07	2.84E-06	1.20E-07	3.63E-06	2.60E-07	5.25E-07	1.27E-06	8.75E-07
FZ03234	2.36E-06	2.84E-07	2.84E-06	1.20E-07	3.63E-06	2.60E-07	5.25E-07	1.27E-06	8.75E-07
BW00119	4.07E-06	4.89E-07	4.90E-06	2.07E-07	6.26E-06	4.48E-07	9.05E-07	2.19E-06	1.51E-06
BW00183	3.94E-06	4.73E-07	4.74E-06	2.00E-07	6.05E-06	4.33E-07	8.75E-07	2.11E-06	1.46E-06
BW00187	4.56E-06	5.47E-07	5.49E-06	2.31E-07	7.01E-06	5.02E-07	1.01E-06	2.45E-06	1.69E-06
KZ00091	1.13E-05	1.35E-06	1.36E-05	5.72E-07	1.73E-05	1.24E-06	2.51E-06	6.06E-06	4.18E-06
KZ00099	9.00E-06	1.08E-06	1.08E-05	4.57E-07	1.38E-05	9.90E-07	2.00E-06	4.83E-06	3.33E-06
E920470279	3.04E-07	3.65E-08	3.66E-07	1.54E-08	4.67E-07	3.35E-08	6.76E-08	1.63E-07	1.13E-07
763412	1.13E-06	1.35E-07	1.36E-06	5.72E-08	1.73E-06	1.24E-07	2.50E-07	6.05E-07	4.17E-07
D980729992	6.71E-06	8.05E-07	8.07E-06	3.40E-07	1.03E-05	7.38E-07	1.49E-06	3.60E-06	2.48E-06
B60573	2.34E-06	2.81E-07	2.82E-06	1.19E-07	3.60E-06	2.58E-07	5.21E-07	1.26E-06	8.68E-07
E910391396	7.17E-07	8.60E-08	8.63E-07	3.64E-08	1.10E-06	7.89E-08	1.59E-07	3.85E-07	2.66E-07
F880130500	7.97E-07	9.56E-08	9.59E-07	4.04E-08	1.22E-06	8.76E-08	1.77E-07	4.28E-07	2.95E-07
L870951713	8.74E-07	1.05E-07	1.05E-06	4.44E-08	1.34E-06	9.62E-08	1.94E-07	4.70E-07	3.24E-07
F820624909	1.57E-06	1.89E-07	1.89E-06	7.97E-08	2.42E-06	1.73E-07	3.49E-07	8.44E-07	5.82E-07
H900340892	5.32E-07	6.39E-08	6.41E-07	2.70E-08	8.18E-07	5.85E-08	1.18E-07	2.86E-07	1.97E-07
J882139997	3.26E-06	3.91E-07	3.92E-06	1.65E-07	5.01E-06	3.58E-07	7.24E-07	1.75E-06	1.21E-06
220030	3.20E-06	3.84E-07	3.85E-06	1.62E-07	4.92E-06	3.52E-07	7.11E-07	1.72E-06	1.19E-06
860984	4.14E-07	4.97E-08	4.98E-07	2.10E-08	6.36E-07	4.55E-08	9.20E-08	2.22E-07	1.53E-07
234660	2.61E-06	3.13E-07	3.14E-06	1.32E-07	4.01E-06	2.87E-07	5.80E-07	1.40E-06	9.67E-07
D3781A/001	5.77E-06	6.92E-07	6.94E-06	2.93E-07	8.86E-06	6.34E-07	1.28E-06	3.10E-06	2.14E-06
A920445325	5.94E-06	7.13E-07	7.15E-06	3.01E-07	9.13E-06	6.53E-07	1.32E-06	3.19E-06	2.20E-06
811147	1.58E-05	1.90E-06	1.90E-05	8.03E-07	2.43E-05	1.74E-06	3.52E-06	8.50E-06	5.86E-06
F820624909	1.52E-06	1.82E-07	1.82E-06	7.69E-08	2.33E-06	1.67E-07	3.37E-07	8.14E-07	5.61E-07
G93051468	1.42E-05	1.71E-06	1.71E-05	7.22E-07	2.19E-05	1.57E-06	3.16E-06	7.64E-06	5.27E-06
K9600622834	5.85E-06	7.03E-07	7.05E-06	2.97E-07	9.00E-06	6.44E-07	1.30E-06	3.14E-06	2.17E-06
30305858	2.72E-07	3.26E-08	3.27E-07	1.38E-08	4.17E-07	2.99E-08	6.03E-08	1.46E-07	1.01E-07
1950585433	2.76E-06	3.31E-07	3.32E-06	1.40E-07	4.24E-06	3.03E-07	6.13E-07	1.48E-06	1.02E-06
A960597151	7.45E-06	8.94E-07	8.96E-06	3.78E-07	1.14E-05	8.19E-07	1.66E-06	4.00E-06	2.76E-06
85B781	4.29E-06	5.14E-07	5.16E-06	2.17E-07	6.59E-06	4.71E-07	9.52E-07	2.30E-06	1.59E-06
85B898	2.82E-06	3.38E-07	3.39E-06	1.43E-07	4.33E-06	3.10E-07	6.26E-07	1.51E-06	1.04E-06
85B866	9.92E-06	1.19E-06	1.19E-05	5.03E-07	1.53E-05	1.09E-06	2.21E-06	5.33E-06	3.68E-06
85B888	4.55E-06	5.45E-07	5.47E-06	2.31E-07	6.99E-06	5.00E-07	1.01E-06	2.44E-06	1.68E-06
85B1033	6.66E-06	8.00E-07	8.02E-06	3.38E-07	1.02E-05	7.33E-07	1.48E-06	3.58E-06	2.47E-06
11475968	3.89E-05	4.67E-06	4.68E-05	1.97E-06	5.98E-05	4.28E-06	8.64E-06	2.09E-05	1.44E-05
11479673	4.07E-05	4.88E-06	4.90E-05	2.06E-06	6.25E-05	4.47E-06	9.04E-06	2.18E-05	1.51E-05
11475970	3.95E-05	4.74E-06	4.75E-05	2.00E-06	6.07E-05	4.34E-06	8.77E-06	2.12E-05	1.46E-05
G880140225	3.04E-09	9.54E-10	9.39E-08	0.00E+00	9.55E-09	1.57E-08	2.57E-08	3.40E-08	2.33E-08
A930497772	2.84E-09	8.90E-10	8.76E-08	0.00E+00	8.91E-09	1.47E-08	2.39E-08	3.17E-08	2.18E-08
99291	3.61E-09	1.13E-09	1.11E-07	0.00E+00	1.13E-08	1.87E-08	3.04E-08	4.03E-08	2.77E-08
81208007	3.71E-09	1.16E-09	1.14E-07	0.00E+00	1.16E-08	1.92E-08	3.12E-08	4.14E-08	2.84E-08
RU190Y8	1.29E-08	4.03E-09	3.97E-07	0.00E+00	4.03E-08	6.64E-08	1.08E-07	1.44E-07	9.86E-08
Total	2.98E-04	3.58E-05	3.60E-04	1.51E-05	4.58E-04	3.29E-05	6.65E-05	1.60E-04	1.11E-04
Total HAPs	**1.54E-03**								

Client:	Malmstrom AFB
Location:	Base-wide
Subject:	Stationary Internal Combustion

Date:	8/15/00
Emissions:	Actual
Calc by:	*DDM*

DIESEL-FIRED (Greater than 447 kW or 600 hp)

G880140225	VTA28-GS2	Caterpillar	500	500	260	52%	671	45
A930497772	500DFFB	Onan	1482	500	295	59%	671	37
99291	VTA-1710-GS2	Cummins	1831	510	375	74%	684	37
81208007	3412	Caterpillar	2040	500	385	77%	671	37
RU190Y8	VHP5900DSI	Waukesha	82110	940	650	69%	1261	76

Equation for generators

E_{pol} = [PO * (LF/100) * OT]/1000 * EF

E_{pol} = Emissions of a particular pollutant (lb/yr)
PO = Rated power output of engine (hp)
LF = Loading Factor (% of maximum power)
OT = Operating time of the engine (hr)
1000 = Factor for converting "hp-hr" to "10^3 hp-hr"
EF = Emission Factor (lb/10^3 hp-hr)

Client: Malmstrom AFB
Location: Base-wide
Subject: Stationary Internal Combustion

Date: 8/15/00
Emissions: Actual
Calc by: *DDM*

Criteria Pollutant Emissions

	Tons per Year				
Serial #	PM/PM_{10}	NO_x	SO_x	CO	VOC
2WOBO1694	0.01	0.08	0.01	0.02	0.01
85Z01446	0.002	0.02	0.001	0.005	0.002
66D48062	0.003	0.04	0.0029	0.01	0.0036
1111754	0.0003	0.004	0.0003	0.001	0.0003
82533M	0.0001	0.001	0.0001	0.0003	0.0001
F880130499	0.0002	0.003	0.0002	0.001	0.0002
H900340891	0.0004	0.01	0.0004	0.001	0.0005
341188	0.0002	0.003	0.0002	0.001	0.0003
KZ04269	0.001	0.01	0.001	0.003	0.001
FZ03234	0.001	0.01	0.001	0.003	0.001
BW00119	0.002	0.02	0.002	0.005	0.002
BW00183	0.002	0.02	0.001	0.005	0.002
BW00187	0.002	0.03	0.002	0.01	0.002
KZ00091	0.005	0.06	0.004	0.01	0.01
KZ00099	0.004	0.05	0.003	0.01	0.004
E920470279	0.0001	0.002	0.0001	0.0004	0.0001
763412	0.0005	0.01	0.000	0.001	0.001
D980729992	0.003	0.04	0.003	0.008	0.003
B60573	0.001	0.01	0.001	0.003	0.001
E910391396	0.0003	0.004	0.0003	0.001	0.0003
F880130500	0.0003	0.005	0.0003	0.001	0.0004
L870951713	0.0004	0.01	0.0003	0.001	0.0004
F820624909	0.001	0.01	0.001	0.002	0.001
H900340892	0.0002	0.0031	0.0002	0.001	0.0002
J882139997	0.001	0.02	0.001	0.004	0.002
220030	0.001	0.02	0.001	0.004	0.001
860984	0.0002	0.0024	0.0002	0.001	0.0002
234660	0.001	0.01	0.001	0.003	0.001
D3781A/001	0.002	0.03	0.002	0.01	0.003
A920445325	0.002	0.03	0.002	0.01	0.003
811147	0.01	0.09	0.01	0.02	0.01
F820624909	0.001	0.01	0.001	0.002	0.001
G93051468	0.01	0.08	0.01	0.02	0.01
K9600622834	0.002	0.03	0.002	0.01	0.003
30305858	0.0001	0.0016	0.0001	0.0003	0.0001
1950585433	0.001	0.02	0.001	0.003	0.001
A960597151	0.003	0.04	0.003	0.01	0.003
85B781	0.002	0.02	0.002	0.01	0.002
85B898	0.001	0.02	0.001	0.003	0.001
85B866	0.004	0.06	0.004	0.01	0.005
85B888	0.002	0.03	0.002	0.01	0.002
85B1033	0.003	0.04	0.003	0.01	0.003
11475968	0.016	0.223	0.015	0.048	0.018
11479673	0.017	0.233	0.015	0.050	0.019
11475970	0.016	0.227	0.015	0.049	0.018

	Tons per Year					
	PM	PM_{10}	NO_x	SO_x	CO	VOC
G880140225	0.004	0.003	0.190	0.035	0.042	0.006
A930497772	0.004	0.003	0.177	0.033	0.039	0.005
99291	0.005	0.003	0.226	0.042	0.049	0.007
81208007	0.005	0.003	0.232	0.043	0.051	0.007
RU190Y8	0.018	0.012	0.803	0.150	0.175	0.024

	Tons per Year					
	PM	PM_{10}	NO_x	SO_x	CO	VOC
Total	0.16	0.14	3.34	0.42	0.72	0.19

Client:	Malmstrom AFB		**Date:**	8/15/00
Location:	Base-wide		**Emissions:**	Actual
Subject:	Stationary Internal Combustion		**Calc by:**	*DDM*

Hazardous Air Pollutant Emissions

	HAPs Tons per Year									TAPs Tons per Year		
Serial Number	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Formaldehyde	Naphthalene	Polycyclic Aromatic Hydrocarbons	Toluene	Xylenes	Propylene	Fluorene	Anthracene
2WOBO1694	1.47E-05	1.77E-06	1.77E-05	7.47E-07	2.26E-05	1.62E-06	3.27E-06	7.90E-06	5.45E-06	4.93E-05	5.56E-07	3.57E-08
85Z01446	3.80E-06	4.56E-07	4.58E-06	1.93E-07	5.84E-06	4.18E-07	8.45E-07	2.04E-06	1.41E-06	1.27E-05	1.44E-07	9.22E-09
66D48062	7.69E-06	9.23E-07	9.26E-06	3.90E-07	1.18E-05	8.46E-07	1.71E-06	4.13E-06	2.85E-06	2.58E-05	2.91E-07	1.87E-08
1111754	7.06E-07	8.47E-08	8.50E-07	3.58E-08	1.09E-06	7.77E-08	1.57E-07	3.79E-07	2.61E-07	2.37E-06	2.67E-08	1.71E-09
82533M	2.46E-07	2.95E-08	2.96E-07	1.25E-08	3.78E-07	2.71E-08	5.47E-08	1.32E-07	9.12E-08	8.25E-07	9.30E-09	5.97E-10
F880130499	4.74E-07	5.69E-08	5.71E-07	2.41E-08	7.29E-07	5.22E-08	1.05E-07	2.55E-07	1.76E-07	1.59E-06	1.79E-08	1.15E-09
H900340891	1.06E-06	1.28E-07	1.28E-06	5.40E-08	1.64E-06	1.17E-07	2.37E-07	5.72E-07	3.94E-07	3.57E-06	4.02E-08	2.58E-09
341188	5.54E-07	6.65E-08	6.67E-07	2.81E-08	8.51E-07	6.09E-08	1.23E-07	2.98E-07	2.05E-07	1.86E-06	2.09E-08	1.34E-09
KZ04269	2.36E-06	2.84E-07	2.84E-06	1.20E-07	3.63E-06	2.60E-07	5.25E-07	1.27E-06	8.75E-07	7.92E-06	8.93E-08	5.73E-09
FZ03234	2.36E-06	2.84E-07	2.84E-06	1.20E-07	3.63E-06	2.60E-07	5.25E-07	1.27E-06	8.75E-07	7.92E-06	8.93E-08	5.73E-09
BW00119	4.07E-06	4.89E-07	4.90E-06	2.07E-07	6.26E-06	4.48E-07	9.05E-07	2.19E-06	1.51E-06	1.37E-05	1.54E-07	9.88E-09
BW00183	3.94E-06	4.73E-07	4.74E-06	2.00E-07	6.05E-06	4.33E-07	8.75E-07	2.11E-06	1.46E-06	1.32E-05	1.49E-07	9.55E-09
BW00187	4.56E-06	5.47E-07	5.49E-06	2.31E-07	7.01E-06	5.02E-07	1.01E-06	2.45E-06	1.69E-06	1.53E-05	1.72E-07	1.11E-08
KZ00091	1.13E-05	1.35E-06	1.36E-05	5.72E-07	1.73E-05	1.24E-06	2.51E-06	6.06E-06	4.18E-06	3.78E-05	4.26E-07	2.74E-08
KZ00099	9.00E-06	1.08E-06	1.08E-05	4.57E-07	1.38E-05	9.90E-07	2.00E-06	4.83E-06	3.33E-06	3.02E-05	3.40E-07	2.18E-08
E920470279	3.04E-07	3.65E-08	3.66E-07	1.54E-08	4.67E-07	3.35E-08	6.76E-08	1.63E-07	1.13E-07	1.02E-06	1.15E-08	7.38E-10
763412	1.13E-06	1.35E-07	1.36E-06	5.72E-08	1.73E-06	1.24E-07	2.50E-07	6.05E-07	4.17E-07	3.78E-06	4.26E-08	2.73E-09
D980729992	6.71E-06	8.05E-07	8.07E-06	3.40E-07	1.03E-05	7.38E-07	1.49E-06	3.60E-06	2.48E-06	2.25E-05	2.53E-07	1.63E-08
B60573	2.34E-06	2.81E-07	2.82E-06	1.19E-07	3.60E-06	2.58E-07	5.21E-07	1.26E-06	8.68E-07	7.86E-06	8.86E-08	5.69E-09
E910391396	7.17E-07	8.60E-08	8.63E-07	3.64E-08	1.10E-06	7.89E-08	1.59E-07	3.85E-07	2.66E-07	2.40E-06	2.71E-08	1.74E-09
F880130500	7.97E-07	9.56E-08	9.59E-07	4.04E-08	1.22E-06	8.76E-08	1.77E-07	4.28E-07	2.95E-07	2.67E-06	3.01E-08	1.93E-09
L870951713	8.74E-07	1.05E-07	1.05E-06	4.44E-08	1.34E-06	9.62E-08	1.94E-07	4.70E-07	3.24E-07	2.93E-06	3.30E-08	2.12E-09
F820624909	1.57E-06	1.89E-07	1.89E-06	7.97E-08	2.42E-06	1.73E-07	3.49E-07	8.44E-07	5.82E-07	5.27E-06	5.94E-08	3.81E-09
H900340892	5.32E-07	6.39E-08	6.41E-07	2.70E-08	8.18E-07	5.85E-08	1.18E-07	2.86E-07	1.97E-07	1.78E-06	2.01E-08	1.29E-09
J882139997	3.26E-06	3.91E-07	3.92E-06	1.65E-07	5.01E-06	3.58E-07	7.24E-07	1.75E-06	1.21E-06	1.09E-05	1.23E-07	7.91E-09
220030	3.20E-06	3.84E-07	3.85E-06	1.62E-07	4.92E-06	3.52E-07	7.11E-07	1.72E-06	1.19E-06	1.07E-05	1.21E-07	7.76E-09
860984	4.14E-07	4.97E-08	4.98E-07	2.10E-08	6.36E-07	4.55E-08	9.20E-08	2.22E-07	1.53E-07	1.39E-06	1.56E-08	1.00E-09
234660	2.61E-06	3.13E-07	3.14E-06	1.32E-07	4.01E-06	2.87E-07	5.80E-07	1.40E-06	9.67E-07	8.75E-06	9.86E-08	6.33E-09
D3781A/001	5.77E-06	6.92E-07	6.94E-06	2.93E-07	8.86E-06	6.34E-07	1.28E-06	3.10E-06	2.14E-06	1.93E-05	2.18E-07	1.40E-08
A920445325	5.94E-06	7.13E-07	7.15E-06	3.01E-07	9.13E-06	6.53E-07	1.32E-06	3.19E-06	2.20E-06	1.99E-05	2.24E-07	1.44E-08
811147	1.58E-05	1.90E-06	1.90E-05	8.03E-07	2.43E-05	1.74E-06	3.52E-06	8.50E-06	5.86E-06	5.30E-05	5.98E-07	3.84E-08
F820624909	1.52E-06	1.82E-07	1.82E-06	7.69E-08	2.33E-06	1.67E-07	3.37E-07	8.14E-07	5.61E-07	5.08E-06	5.72E-08	3.68E-09
G93051468	1.42E-05	1.71E-06	1.71E-05	7.22E-07	2.19E-05	1.57E-06	3.16E-06	7.64E-06	5.27E-06	4.77E-05	5.38E-07	3.45E-08
K9600622834	5.85E-06	7.03E-07	7.05E-06	2.97E-07	9.00E-06	6.44E-07	1.30E-06	3.14E-06	2.17E-06	1.96E-05	2.21E-07	1.42E-08
30305858	2.72E-07	3.26E-08	3.27E-07	1.38E-08	4.17E-07	2.99E-08	6.03E-08	1.46E-07	1.01E-07	9.10E-07	1.03E-08	6.59E-10
1950585433	2.76E-06	3.31E-07	3.32E-06	1.40E-07	4.24E-06	3.03E-07	6.13E-07	1.48E-06	1.02E-06	9.25E-06	1.04E-07	6.69E-09
A960597151	7.45E-06	8.94E-07	8.96E-06	3.78E-07	1.14E-05	8.19E-07	1.66E-06	4.00E-06	2.76E-06	2.50E-05	2.81E-07	1.81E-08
85B781	4.29E-06	5.14E-07	5.16E-06	2.17E-07	6.59E-06	4.71E-07	9.52E-07	2.30E-06	1.59E-06	1.44E-05	1.62E-07	1.04E-08
85B898	2.82E-06	3.38E-07	3.39E-06	1.43E-07	4.33E-06	3.10E-07	6.26E-07	1.51E-06	1.04E-06	9.45E-06	1.06E-07	6.84E-09
85B866	9.92E-06	1.19E-06	1.19E-05	5.03E-07	1.53E-05	1.09E-06	2.21E-06	5.33E-06	3.68E-06	3.33E-05	3.75E-07	2.41E-08
85B888	4.55E-06	5.45E-07	5.47E-06	2.31E-07	6.99E-06	5.00E-07	1.01E-06	2.44E-06	1.68E-06	1.52E-05	1.72E-07	1.10E-08
85B1033	6.66E-06	8.00E-07	8.02E-06	3.38E-07	1.02E-05	7.33E-07	1.48E-06	3.58E-06	2.47E-06	2.23E-05	2.52E-07	1.62E-08
11475968	3.89E-05	4.67E-06	4.68E-05	1.97E-06	5.98E-05	4.28E-06	8.64E-06	2.09E-05	1.44E-05	1.30E-04	1.47E-06	9.43E-08
11479673	4.07E-05	4.88E-06	4.90E-05	2.06E-06	6.25E-05	4.47E-06	9.04E-06	2.18E-05	1.51E-05	1.36E-04	1.54E-06	9.87E-08
11475970	3.95E-05	4.74E-06	4.75E-05	2.00E-06	6.07E-05	4.34E-06	8.77E-06	2.12E-05	1.46E-05	1.32E-04	1.49E-06	9.58E-08
G880140225	3.04E-09	9.54E-10	9.39E-08	0.00E+00	9.55E-09	1.57E-08	2.57E-08	3.40E-08	2.33E-08	3.38E-07	1.55E-09	1.49E-10
A930497772	2.84E-09	8.90E-10	8.76E-08	0.00E+00	8.91E-09	1.47E-08	2.39E-08	3.17E-08	2.18E-08	3.15E-07	1.45E-09	1.39E-10
99291	3.61E-09	1.13E-09	1.11E-07	0.00E+00	1.13E-08	1.87E-08	3.04E-08	4.03E-08	2.77E-08	4.01E-07	1.84E-09	1.77E-10
81208007	3.71E-09	1.16E-09	1.14E-07	0.00E+00	1.16E-08	1.92E-08	3.12E-08	4.14E-08	2.84E-08	4.11E-07	1.89E-09	1.81E-10
RU190Y8	1.29E-08	4.03E-09	3.97E-07	0.00E+00	4.03E-08	6.64E-08	1.08E-07	1.44E-07	9.86E-08	1.43E-06	6.54E-09	6.29E-10
Total	2.98E-04	3.58E-05	3.60E-04	1.51E-05	4.58E-04	3.29E-05	6.65E-05	1.60E-04	1.11E-04	1.00E-03	1.13E-05	7.25E-07
Total HAPs	**1.54E-03**											

Client:	Malmstrom AFB	**Date:**	8/15/00
Location:	Base-wide	**Emissions:**	Potential
Subject:	Stationary Internal Combustion	**Calc by:**	*DDM*

Parameter	Quantity	Units	Basis
1. Emission Factors (Diesel Reciprocating up to 600 hp)			
PM/PM_{10}	2.2	$lb/10^3$ hp-hr	Table 29-3, AEI Guidance Document
NO_x	31	$lb/10^3$ hp-hr	Table 29-3, AEI Guidance Document
SO_x	2.05	$lb/10^3$ hp-hr	Table 29-3, AEI Guidance Document
CO	6.68	$lb/10^3$ hp-hr	Table 29-3, AEI Guidance Document
VOC	2.5	$lb/10^3$ hp-hr	Table 29-3, AEI Guidance Document
Acetaldehyde	0.0054	$lb/10^3$ hp-hr	Table 29-3, AEI Guidance Document
Acrolein	0.000648	$lb/10^3$ hp-hr	Table 29-3, AEI Guidance Document
Benzene	0.0065	$lb/10^3$ hp-hr	Table 29-3, AEI Guidance Document
1,3-Butadiene	0.000274	$lb/10^3$ hp-hr	Table 29-3, AEI Guidance Document
Formaldehyde	0.0083	$lb/10^3$ hp-hr	Table 29-3, AEI Guidance Document
Naphthalene	0.000594	$lb/10^3$ hp-hr	Table 29-3, AEI Guidance Document
Polycyclic Aromatic Hydrocarbons	0.0012	$lb/10^3$ hp-hr	Table 29-3, AEI Guidance Document
Toluene	0.0029	$lb/10^3$ hp-hr	Table 29-3, AEI Guidance Document
Xylenes	0.002	$lb/10^3$ hp-hr	Table 29-3, AEI Guidance Document
Propylene	0.0181	$lb/10^3$ hp-hr	Table 3.3-3 AP-42 (converted to output units)
Fluorene	0.000204	$lb/10^3$ hp-hr	Table 3.3-3 AP-42 (converted to output units)
Anthracene	0.0000131	$lb/10^3$ hp-hr	Table 3.3-3 AP-42 (converted to output units)
2. Emission Factors (Diesel Reciprocating greater than 600 hp)			
PM	0.2426	grams/hp-hr	Table 3.4-5, AP-42
PM_{10}	0.1578	grams/hp-hr	Table 3.4-5, AP-42
NO_x	11	grams/hp-hr	Table 3.4-1, AP-42
SO_x	2.05	grams/hp-hr	Table 3.4-1, AP-42
CO	2.4	grams/hp-hr	Table 3.4-1, AP-42
VOC	0.33	grams/hp-hr	Table 3.4-1, AP-42
Acetaldehyde	0.000176	$lb/10^3$ hp-hr	Table 3.4-3, AP-42 (converted to output units)
Acrolein	0.00006	$lb/10^3$ hp-hr	Table 3.4-3, AP-42 (converted to output units)
Benzene	0.00543	$lb/10^3$ hp-hr	Table 3.4-3, AP-42 (converted to output units)
Formaldehyde	0.0005523	$lb/10^3$ hp-hr	Table 3.4-3, AP-42 (converted to output units)
Naphthalene	0.00091	$lb/10^3$ hp-hr	Table 3.4-4, AP-42 (converted to output units)
Polycyclic Aromatic Hydrocarbons	0.001484	$lb/10^3$ hp-hr	Table 3.4-4, AP-42 (converted to output units)
Toluene	0.001967	$lb/10^3$ hp-hr	Table 3.4-3, AP-42 (converted to output units)
Xylenes	0.00135	$lb/10^3$ hp-hr	Table 3.4-3, AP-42 (converted to output units)
Propylene	0.01953	$lb/10^3$ hp-hr	Table 3.4-3, AP-42 (converted to output units)
Fluorene	0.00009	$lb/10^3$ hp-hr	Table 3.4-4, AP-42 (converted to output units)
Anthracene	0.00001	$lb/10^3$ hp-hr	Table 3.4-4, AP-42 (converted to output units)

Client:	Malmstrom AFB	**Date:**	8/15/00
Location:	Base-wide	**Emissions:**	Potential
Subject:	Stationary Internal Combustion	**Calc by:**	*DDM*

DIESEL-FIRED (Up to 447 kW or 600 hp)

Emergency Generator?*	Serial #	Model #	Manufacturer	Building	Rated power output, kW	Actual Load, kW	% of Maximum Power	Rated power output, hp	Potential Time, Hours
Yes	2WOBO1694	3406DI	Caterpillar	144	250	150	60%	335	500
Yes	85Z01446	3406DI	Caterpillar	152	175	100	57%	235	500
Yes	66D48062	3306PC	Caterpillar	160	155	85	55%	208	500
Yes	1111754	5.0EGHEB	Onan	200	5	3	60%	7	500
Yes	82533M	TP-5A4-DC	Over-Lowe	200	6	4	67%	8	500
Yes	F880130499	15-RDJC	Onan	200	15	10	67%	20	500
Yes	H900340891	15-RDJC	Onan	200	15	10	67%	20	500
Yes	341188	S20D18	US Motors	200	20	10	50%	27	500
Yes	KZ04269	MEP-005A	Hollingsworth	200	30	25	83%	40	500
Yes	FZ03234	MEP-006A	Fermont	200	60	45	75%	80	500
Yes	BW00119	MEP-007B	Foster Ent.	200	100	75	75%	134	500
Yes	BW00183	MEP-007B	Foster Ent.	200	100	75	75%	134	500
Yes	BW00187	MEP-007B	Foster Ent.	200	100	75	75%	134	500
Yes	KZ00091	MEP-009B	Hollingsworth	200	200	175	88%	268	500
Yes	KZ00099	MEP-009B	Hollingsworth	200	200	175	88%	268	500
Yes	E920470279	100DGBD	Onan	249	100	35	35%	134	500
Yes	763412	SD020	Generac	294	15	8	53%	20	500
Yes	D980729992	100DGDB	Onan	348	100	75	75%	134	500
Yes	B60573	DMT-60C3	DMT	407	60	25	42%	80	500
Yes	E910391396	30DGAD	Onan	429	30	12	40%	40	500
Yes	F880130500	15-RDJC	Onan	496	15	10	67%	20	500
Yes	L870951713	20.0DL4	Onan	530	20	15	75%	27	500
Yes	F820624909	30.0ODDA-15R	Onan	771	30	20	67%	40	500
Yes	H900340892	15.ORDJC	Onan	910	15	5	33%	20	500
Yes	J882139997	NTA-855-G52	Cummins	1075	300	225	75%	402	500
Yes	220030	6CT8.3GC	Cummins	1082	125	65	52%	168	500
Yes	860984	88A01093-6	Generac	1320	20	9	45%	27	500
Yes	234660	4BT3.9G2	Cummins	1408	60	35	58%	80	500
Yes	D3781A/001	D100P1/001	Olympian	1439	100	65	65%	134	500
Yes	A920445325	100DGDB	Onan	1440	100	85	85%	134	500
Yes	811147	175DGFB	Onan	1839	100	100	100%	134	500
Yes	F820624909	30.0DDA	Onan	1879	30	15	50%	40	500
Yes	G93051468	35EGBB	Onan	1881	35	16	46%	47	500
Yes	K9600622834	100DGDB	Onan	1848	100	55	55%	134	500
Yes	30305858	NT855652	Cummins	1884	200	75	38%	268	500
Yes	1950585433	100DGDB	Onan	1996	100	60	60%	134	500
Yes	A960597151	125-DGEA	Onan	3080	125	85	68%	168	500
Yes	85B781	D330	Caterpillar	P00	75	45	60%	101	500
Yes	85B898	D330	Caterpillar	Q00	75	45	60%	101	500
Yes	85B866	D330	Caterpillar	R00	75	45	60%	101	500
Yes	85B888	D330	Caterpillar	S00	75	45	60%	101	500
Yes	85B1033	D330	Caterpillar	T00	75	45	60%	101	500
Yes	11475968	NT-855-F3	Cummins	1459	PUMP**	20 gal/hr	-	-	500
Yes	11479673	NT-855-F3	Cummins	1459	PUMP**	20 gal/hr	-	-	500
Yes	11475970	NT-855-F3	Cummins	1459	PUMP**	20 gal/hr	-	-	500

* Emergency generator status from 1996 AEI - assumed all are emergency/back-up electricity.

** For pumps: 20 gallons/hr x 54.975 hP-hr/gal x Y hours per year = hP-hr/yr x EF

Client:	Malmstrom AFB	**Date:**	8/15/00
Location:	Base-wide	**Emissions:**	Potential
Subject:	Stationary Internal Combustion	**Calc by:**	*DDM*

DIESEL-FIRED (Greater than 447 kW or 600 hp)

Emergency generator?*									
Yes	G880140225	VTA28-GS2	Caterpillar	500	500	260	52%	671	500
Yes	A930497772	500DFFB	Onan	1482	500	295	59%	671	500
Yes	99291	VTA-1710-GS2	Cummins	1831	510	375	74%	684	500
Yes	81208007	3412	Caterpillar	2040	500	385	77%	671	500
Yes	RU190Y8	VHP5900DSI	Waukesha	82110	940	650	69%	1261	500

Equation for generators

E_{pol} = [PO * (LF/100) * OT]/1000 * EF

E_{pol} = Emissions of a particular pollutant (lb/yr)
PO = Rated power output of engine (hp)
LF = Loading Factor (% of maximum power)
OT = Operating time of the engine (hr)
1000 = Factor for converting "hp-hr" to "10^3 hp-hr"
EF = Emission Factor (lb/10^3 hp-hr)

Client: Malmstrom AFB
Location: Base-wide
Subject: Stationary Internal Combustion

Date: 8/15/00
Emissions: Potential
Calc by: *DDM*

Criteria Pollutant Emissions

	Tons per Year				
Serial #	PM/PM_{10}	NO_x	SO_x	CO	VOC
2WOBO1694	0.11	1.56	0.10	0.34	0.13
85Z01446	0.074	1.04	0.069	0.224	0.084
66D48062	0.063	0.88	0.0584	0.19	0.0712
1111754	0.0022	0.031	0.0021	0.007	0.0025
82533M	0.0030	0.042	0.0027	0.0090	0.0034
F880130499	0.0074	0.104	0.0069	0.022	0.0084
H900340891	0.0074	0.10	0.0069	0.022	0.0084
341188	0.0074	0.104	0.0069	0.022	0.0084
KZ04269	0.018	0.26	0.017	0.056	0.021
FZ03234	0.033	0.47	0.031	0.101	0.038
BW00119	0.055	0.78	0.052	0.168	0.063
BW00183	0.055	0.78	0.052	0.168	0.063
BW00187	0.055	0.78	0.052	0.17	0.063
KZ00091	0.129	1.82	0.120	0.39	0.15
KZ00099	0.129	1.82	0.120	0.39	0.147
E920470279	0.0258	0.364	0.0241	0.0784	0.0293
763412	0.0059	0.08	0.005	0.018	0.007
D980729992	0.055	0.78	0.052	0.168	0.063
B60573	0.018	0.26	0.017	0.056	0.021
E910391396	0.0089	0.125	0.0082	0.027	0.0101
F880130500	0.0074	0.104	0.0069	0.022	0.0084
L870951713	0.0111	0.16	0.0103	0.034	0.0126
F820624909	0.015	0.21	0.014	0.045	0.017
H900340892	0.0037	0.0520	0.0034	0.011	0.0042
J882139997	0.166	2.34	0.155	0.504	0.189
220030	0.048	0.68	0.045	0.146	0.054
860984	0.0066	0.0935	0.0062	0.020	0.0075
234660	0.026	0.36	0.024	0.078	0.029
D3781A/001	0.048	0.68	0.045	0.15	0.054
A920445325	0.063	0.88	0.058	0.19	0.071
811147	0.07	1.04	0.07	0.22	0.08
F820624909	0.011	0.16	0.010	0.034	0.013
G93051468	0.01	0.17	0.01	0.04	0.01
K9600622834	0.041	0.57	0.038	0.12	0.046
30305858	0.0553	0.7795	0.0515	0.1680	0.0629
1950585433	0.044	0.62	0.041	0.134	0.050
A960597151	0.063	0.88	0.058	0.19	0.071
85B781	0.033	0.47	0.031	0.10	0.038
85B898	0.033	0.47	0.031	0.101	0.038
85B866	0.033	0.47	0.031	0.10	0.038
85B888	0.033	0.47	0.031	0.10	0.038
85B1033	0.033	0.47	0.031	0.10	0.038
11475968	0.605	8.521	0.563	1.836	0.687
11479673	0.605	8.521	0.563	1.836	0.687
11475970	0.605	8.521	0.563	1.836	0.687

	Tons per Year					
	PM	PM_{10}	NO_x	SO_x	CO	VOC
G880140225	0.047	0.030	2.114	0.394	0.461	0.063
A930497772	0.053	0.034	2.398	0.447	0.523	0.072
99291	0.067	0.044	3.049	0.568	0.665	0.091
81208007	0.069	0.045	3.130	0.583	0.683	0.094
RU190Y8	0.117	0.076	5.284	0.985	1.153	0.159

	Tons per Year					
	PM	PM_{10}	NO_x	SO_x	CO	VOC
Total	3.89	3.77	65.83	6.27	14.23	4.50

Client:	Malmstrom AFB	**Date:**	8/15/00
Location:	Base-wide	**Emissions:**	Potential
Subject:	Stationary Internal Combustion	**Calc by:**	*DDM*

Hazardous Air Pollutant Emissions

	HAPs Tons per Year									TAPs Tons per Year		
Serial Number	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Formaldehyde	Naphthalene	Polycyclic Aromatic Hydrocarbons	Toluene	Xylenes	Propylene	Fluorene	Anthracene
2WOBO1694	2.72E-04	3.26E-05	3.27E-04	1.38E-05	4.17E-04	2.99E-05	6.03E-05	1.46E-04	1.01E-04	9.10E-04	1.03E-05	6.59E-07
85Z01446	1.81E-04	2.17E-05	2.18E-04	9.19E-06	2.78E-04	1.99E-05	4.02E-05	9.72E-05	6.71E-05	6.07E-04	6.84E-06	4.39E-07
66D48062	1.54E-04	1.85E-05	1.85E-04	7.81E-06	2.37E-04	1.69E-05	3.42E-05	8.26E-05	5.70E-05	5.16E-04	5.81E-06	3.73E-07
1111754	5.43E-06	6.52E-07	6.54E-06	2.76E-07	8.35E-06	5.97E-07	1.21E-06	2.92E-06	2.01E-06	1.82E-05	2.05E-07	1.32E-08
82533M	7.24E-06	8.69E-07	8.72E-06	3.67E-07	1.11E-05	7.97E-07	1.61E-06	3.89E-06	2.68E-06	2.43E-05	2.74E-07	1.76E-08
F880130499	1.81E-05	2.17E-06	2.18E-05	9.19E-07	2.78E-05	1.99E-06	4.02E-06	9.72E-06	6.71E-06	6.07E-05	6.84E-07	4.39E-08
H900340891	1.81E-05	2.17E-06	2.18E-05	9.19E-07	2.78E-05	1.99E-06	4.02E-06	9.72E-06	6.71E-06	6.07E-05	6.84E-07	4.39E-08
341188	1.81E-05	2.17E-06	2.18E-05	9.19E-07	2.78E-05	1.99E-06	4.02E-06	9.72E-06	6.71E-06	6.07E-05	6.84E-07	4.39E-08
KZ04269	4.53E-05	5.43E-06	5.45E-05	2.30E-06	6.96E-05	4.98E-06	1.01E-05	2.43E-05	1.68E-05	1.52E-04	1.71E-06	1.10E-07
FZ03234	8.15E-05	9.78E-06	9.81E-05	4.13E-06	1.25E-04	8.96E-06	1.81E-05	4.38E-05	3.02E-05	2.73E-04	3.08E-06	1.98E-07
BW00119	1.36E-04	1.63E-05	1.63E-04	6.89E-06	2.09E-04	1.49E-05	3.02E-05	7.29E-05	5.03E-05	4.55E-04	5.13E-06	3.29E-07
BW00183	1.36E-04	1.63E-05	1.63E-04	6.89E-06	2.09E-04	1.49E-05	3.02E-05	7.29E-05	5.03E-05	4.55E-04	5.13E-06	3.29E-07
BW00187	1.36E-04	1.63E-05	1.63E-04	6.89E-06	2.09E-04	1.49E-05	3.02E-05	7.29E-05	5.03E-05	4.55E-04	5.13E-06	3.29E-07
KZ00091	3.17E-04	3.80E-05	3.81E-04	1.61E-05	4.87E-04	3.48E-05	7.04E-05	1.70E-04	1.17E-04	1.06E-03	1.20E-05	7.69E-07
KZ00099	3.17E-04	3.80E-05	3.81E-04	1.61E-05	4.87E-04	3.48E-05	7.04E-05	1.70E-04	1.17E-04	1.06E-03	1.20E-05	7.69E-07
E920470279	6.34E-05	7.60E-06	7.63E-05	3.22E-06	9.74E-05	6.97E-06	1.41E-05	3.40E-05	2.35E-05	2.12E-04	2.39E-06	1.54E-07
763412	1.45E-05	1.74E-06	1.74E-05	7.35E-07	2.23E-05	1.59E-06	3.22E-06	7.78E-06	5.36E-06	4.85E-05	5.47E-07	3.51E-08
D980729992	1.36E-04	1.63E-05	1.63E-04	6.89E-06	2.09E-04	1.49E-05	3.02E-05	7.29E-05	5.03E-05	4.55E-04	5.13E-06	3.29E-07
B60573	4.53E-05	5.43E-06	5.45E-05	2.30E-06	6.96E-05	4.98E-06	1.01E-05	2.43E-05	1.68E-05	1.52E-04	1.71E-06	1.10E-07
E910391396	2.17E-05	2.61E-06	2.61E-05	1.10E-06	3.34E-05	2.39E-06	4.83E-06	1.17E-05	8.05E-06	7.28E-05	8.21E-07	5.27E-08
F880130500	1.81E-05	2.17E-06	2.18E-05	9.19E-07	2.78E-05	1.99E-06	4.02E-06	9.72E-06	6.71E-06	6.07E-05	6.84E-07	4.39E-08
L870951713	2.72E-05	3.26E-06	3.27E-05	1.38E-06	4.17E-05	2.99E-06	6.03E-06	1.46E-05	1.01E-05	9.10E-05	1.03E-06	6.59E-08
F820624909	3.62E-05	4.34E-06	4.36E-05	1.84E-06	5.57E-05	3.98E-06	8.05E-06	1.94E-05	1.34E-05	1.21E-04	1.37E-06	8.78E-08
H900340892	9.05E-06	1.09E-06	1.09E-05	4.59E-07	1.39E-05	9.96E-07	2.01E-06	4.86E-06	3.35E-06	3.03E-05	3.42E-07	2.20E-08
J882139997	4.07E-04	4.89E-05	4.90E-04	2.07E-05	6.26E-04	4.48E-05	9.05E-05	2.19E-04	1.51E-04	1.37E-03	1.54E-05	9.88E-07
220030	1.18E-04	1.41E-05	1.42E-04	5.97E-06	1.81E-04	1.29E-05	2.61E-05	6.32E-05	4.36E-05	3.94E-04	4.45E-06	2.85E-07
860984	1.63E-05	1.96E-06	1.96E-05	8.27E-07	2.50E-05	1.79E-06	3.62E-06	8.75E-06	6.03E-06	5.46E-05	6.16E-07	3.95E-08
234660	6.34E-05	7.60E-06	7.63E-05	3.22E-06	9.74E-05	6.97E-06	1.41E-05	3.40E-05	2.35E-05	2.12E-04	2.39E-06	1.54E-07
D3781A/001	1.18E-04	1.41E-05	1.42E-04	5.97E-06	1.81E-04	1.29E-05	2.61E-05	6.32E-05	4.36E-05	3.94E-04	4.45E-06	2.85E-07
A920445325	1.54E-04	1.85E-05	1.85E-04	7.81E-06	2.37E-04	1.69E-05	3.42E-05	8.26E-05	5.70E-05	5.16E-04	5.81E-06	3.73E-07
811147	1.81E-04	2.17E-05	2.18E-04	9.19E-06	2.78E-04	1.99E-05	4.02E-05	9.72E-05	6.71E-05	6.07E-04	6.84E-06	4.39E-07
F820624909	2.72E-05	3.26E-06	3.27E-05	1.38E-06	4.17E-05	2.99E-06	6.03E-06	1.46E-05	1.01E-05	9.10E-05	1.03E-06	6.59E-08
G93051468	2.90E-05	3.48E-06	3.49E-05	1.47E-06	4.45E-05	3.19E-06	6.44E-06	1.56E-05	1.07E-05	9.71E-05	1.09E-06	7.03E-08
K9600622834	9.96E-05	1.19E-05	1.20E-04	5.05E-06	1.53E-04	1.10E-05	2.21E-05	5.35E-05	3.69E-05	3.34E-04	3.76E-06	2.42E-07
30305858	1.36E-04	1.63E-05	1.63E-04	6.89E-06	2.09E-04	1.49E-05	3.02E-05	7.29E-05	5.03E-05	4.55E-04	5.13E-06	3.29E-07
1950585433	1.09E-04	1.30E-05	1.31E-04	5.51E-06	1.67E-04	1.19E-05	2.41E-05	5.83E-05	4.02E-05	3.64E-04	4.10E-06	2.64E-07
A960597151	1.54E-04	1.85E-05	1.85E-04	7.81E-06	2.37E-04	1.69E-05	3.42E-05	8.26E-05	5.70E-05	5.16E-04	5.81E-06	3.73E-07
85B781	8.15E-05	9.78E-06	9.81E-05	4.13E-06	1.25E-04	8.96E-06	1.81E-05	4.38E-05	3.02E-05	2.73E-04	3.08E-06	1.98E-07
85B898	8.15E-05	9.78E-06	9.81E-05	4.13E-06	1.25E-04	8.96E-06	1.81E-05	4.38E-05	3.02E-05	2.73E-04	3.08E-06	1.98E-07
85B866	8.15E-05	9.78E-06	9.81E-05	4.13E-06	1.25E-04	8.96E-06	1.81E-05	4.38E-05	3.02E-05	2.73E-04	3.08E-06	1.98E-07
85B888	8.15E-05	9.78E-06	9.81E-05	4.13E-06	1.25E-04	8.96E-06	1.81E-05	4.38E-05	3.02E-05	2.73E-04	3.08E-06	1.98E-07
85B1033	8.15E-05	9.78E-06	9.81E-05	4.13E-06	1.25E-04	8.96E-06	1.81E-05	4.38E-05	3.02E-05	2.73E-04	3.08E-06	1.98E-07
11475968	1.48E-03	1.78E-04	1.79E-03	7.53E-05	2.28E-03	1.63E-04	3.30E-04	7.97E-04	5.50E-04	4.98E-03	5.61E-05	3.60E-06
11479673	1.48E-03	1.78E-04	1.79E-03	7.53E-05	2.28E-03	1.63E-04	3.30E-04	7.97E-04	5.50E-04	4.98E-03	5.61E-05	3.60E-06
11475970	1.48E-03	1.78E-04	1.79E-03	7.53E-05	2.28E-03	1.63E-04	3.30E-04	7.97E-04	5.50E-04	4.98E-03	5.61E-05	3.60E-06
G880140225	3.38E-08	1.06E-08	1.04E-06	0.00E+00	1.06E-07	1.75E-07	2.85E-07	3.78E-07	2.59E-07	3.75E-06	1.72E-08	1.65E-09
A930497772	3.84E-08	1.20E-08	1.18E-06	0.00E+00	1.20E-07	1.98E-07	3.24E-07	4.29E-07	2.94E-07	4.26E-06	1.95E-08	1.88E-09
99291	4.88E-08	1.53E-08	1.50E-06	0.00E+00	1.53E-07	2.52E-07	4.11E-07	5.45E-07	3.74E-07	5.41E-06	2.48E-08	2.39E-09
81208007	5.01E-08	1.57E-08	1.55E-06	0.00E+00	1.57E-07	2.59E-07	4.22E-07	5.60E-07	3.84E-07	5.56E-06	2.55E-08	2.45E-09
RU190Y8	8.46E-08	2.65E-08	2.61E-06	0.00E+00	2.65E-07	4.37E-07	7.13E-07	9.45E-07	6.49E-07	9.38E-06	4.30E-08	4.14E-09
Total	8.68E-03	1.04E-03	1.05E-02	4.41E-04	1.33E-02	9.57E-04	1.93E-03	4.67E-03	3.22E-03	2.91E-02	3.28E-04	2.11E-05
Total HAPs	**4.47E-02**											

Client:	Malmstrom AFB		
Location:	Military Gas Station	**Date:**	8/24/00
Subject:	Compressed Natural Gas - 460 cubic inch Ford engine	**Emissions:**	Actual
		Calc by:	*DDM*

Parameter	**Quantity**	**Units**	**Basis**
Emission Factors (Natural gas-fired engines)			
PM/PM_{10}	3.35E-01	lb/1000 hp-hr	Table 29-6, AEI Guidance Document
NO_x	2.87	lb/1000 hp-hr	Table 29-6, AEI Guidance Document
SO_x	4.57E-03	lb/1000 hp-hr	Table 29-6, AEI Guidance Document
CO	1.83	lb/1000 hp-hr	Table 29-6, AEI Guidance Document
VOC	0.022	lb/1000 hp-hr	Table 29-6, AEI Guidance Document
acetaldehyde	1.26E-04	lb/1000 hp-hr	Table 29-6, AEI Guidance Document
cadmium	5.54E-05	lb/1000 hp-hr	Table 29-6, AEI Guidance Document
chromium	1.06E-04	lb/1000 hp-hr	Table 29-6, AEI Guidance Document
formaldehyde	2.60E-03	lb/1000 hp-hr	Table 29-6, AEI Guidance Document
manganese	6.42E-04	lb/1000 hp-hr	Table 29-6, AEI Guidance Document
mercury	5.30E-05	lb/1000 hp-hr	Table 29-6, AEI Guidance Document
naphthalene	4.82E-05	lb/1000 hp-hr	Table 29-6, AEI Guidance Document
nickel	9.18E-04	lb/1000 hp-hr	Table 29-6, AEI Guidance Document
phenol	1.02E-04	lb/1000 hp-hr	Table 29-6, AEI Guidance Document
toluenes	3.95E-03	lb/1000 hp-hr	Table 29-6, AEI Guidance Document
xylenes	8.79E-03	lb/1000 hp-hr	Table 29-6, AEI Guidance Document

Description	Building	Engine size, cu in	Horsepower	Hours operated/yr
Compressed Natural Gas System 460 cu. inch Ford Engine	144	460	1000	50.0

E_{pol} = [PO * (LF/100) * OT]/1000 * EF

E_{pol} = Emissions of a particular pollutant (lb/yr)		
PO = Rated power output of engine (hp)	1000	Assumption based on literature search
LF = Loading Factor (% of maximum power)	70%	Conservative assumption
OT = Operating time of the engine (hr)	50	Conservative based on 75 hours operated during the last 3 yrs
1000 = Factor for converting "hp-hr" to "10^3 hp-hr"		
EF = Emission Factor (lb/10^3 hp-hr)		

Criteria Pollutant Emissions

Serial #	Tons per Year				
	PM/PM_{10}	NO_x	SO_x	CO	VOC
Compressed Natural Gas System 460 cu. inch Ford Engine	**0.006**	**0.05**	**0.00008**	**0.03**	**0.0004**

Hazardous Air Pollutant Emissions

Pollutant	Tons per Year
acetaldehyde	0.000002
cadmium	0.0000010
chromium	0.000002
formaldehyde	0.000046
manganese	0.000011
mercury	0.0000009
naphthalene	0.0000008
nickel	0.000016
phenol	0.000002
toluenes	0.000069
xylenes	0.000154
HAPs Total, tons	**0.00030**

Client:	Malmstrom AFB	**Date:**	8/24/00
Location:	Military Gas Station	**Emissions:**	Potential
Subject:	Compressed Natural Gas - 460 cubic inch Ford engine	**Calc by:**	*DDM*

Parameter	**Quantity**	**Units**	**Basis**
Emission Factors (Natural gas-fired engines)			
PM/PM_{10}	3.35E-01	lb/1000 hp-hr	Table 29-6, AEI Guidance Document
NO_x	2.87	lb/1000 hp-hr	Table 29-6, AEI Guidance Document
SO_x	4.57E-03	lb/1000 hp-hr	Table 29-6, AEI Guidance Document
CO	1.83	lb/1000 hp-hr	Table 29-6, AEI Guidance Document
VOC	0.022	lb/1000 hp-hr	Table 29-6, AEI Guidance Document
acetaldehyde	1.26E-04	lb/1000 hp-hr	Table 29-6, AEI Guidance Document
cadmium	5.54E-05	lb/1000 hp-hr	Table 29-6, AEI Guidance Document
chromium	1.06E-04	lb/1000 hp-hr	Table 29-6, AEI Guidance Document
formaldehyde	2.60E-03	lb/1000 hp-hr	Table 29-6, AEI Guidance Document
manganese	6.42E-04	lb/1000 hp-hr	Table 29-6, AEI Guidance Document
mercury	5.30E-05	lb/1000 hp-hr	Table 29-6, AEI Guidance Document
naphthalene	4.82E-05	lb/1000 hp-hr	Table 29-6, AEI Guidance Document
nickel	9.18E-04	lb/1000 hp-hr	Table 29-6, AEI Guidance Document
phenol	1.02E-04	lb/1000 hp-hr	Table 29-6, AEI Guidance Document
toluenes	3.95E-03	lb/1000 hp-hr	Table 29-6, AEI Guidance Document
xylenes	8.79E-03	lb/1000 hp-hr	Table 29-6, AEI Guidance Document

Description	Building	Engine size, cu in	Horsepower	Hours operated/yr
Compressed Natural Gas System 460 cu. inch Ford Engine	144	460	1000	210.6

E_{pol} = [PO * (LF/100) * OT]/1000 * EF

E_{pol} = Emissions of a particular pollutant (lb/yr)		
PO = Rated power output of engine (hp)	1000	Assumption based on literature search
LF = Loading Factor (% of maximum power)	70%	Conservative assumption
OT = Operating time of the engine (hr)	211	Scaled up actual hours using 8760 divided by 2080
1000 = Factor for converting "hp-hr" to "10^3 hp-hr"		
EF = Emission Factor (lb/10^3 hp-hr)		

Criteria Pollutant Emissions

	Tons per Year				
Serial #	**PM/PM_{10}**	**NO_x**	**SO_x**	**CO**	**VOC**
Compressed Natural Gas System 460 cu. inch Ford Engine	**0.02**	**0.21**	**0.0003**	**0.1**	**0.0016**

Hazardous Air Pollutant Emissions

Pollutant	Tons per Year
acetaldehyde	0.000009
cadmium	0.000004
chromium	0.000008
formaldehyde	0.000192
manganese	0.000047
mercury	0.000004
naphthalene	0.000004
nickel	0.000068
phenol	0.000008
toluenes	0.000291
xylenes	0.000648
HAPs Total, tons	**0.00128**

SECTION 26

SULFURIC ACID BATTERY MAINTENANCE

Source Description

Sulfuric acid batteries are serviced by the MAFB. During servicing, sulfuric acid fumes are vented to the atmosphere through a vent in the shop. The applicable SIC codes for this process is 97 for National Security and International Affairs and to a lesser degree 75, Automotive Repair, Services and Parking. Although a specific SCC code is not identified for this process, SCC 3-01-023-22 (Industrial Processes, Chemical Manufacturing, Sulfuric Acid Contact Processes, Process Equipment Leaks) is somewhat applicable.

Actual Emissions

Emission factors were not available for sulfuric acid battery maintenance. AP-42, Section 7.15, includes a factor for the "formation" stage of lead acid battery production, in which the lead plates are immersed in sulfuric acid solution and connected to the positive and negative current sources. Sulfuric acid is emitted at this point in aerosol form. The emission factor listed for this process in 32.4 pounds per 1,000 batteries produced. MSgt William Kelly provided the number of batteries condemned and the total sulfuric acid usage for 1999. MAFB drained 35 batteries in 1999 emitting 1 pound of sulfuric acid.

See the calculation worksheet for further calculation methodology and emission summary.

Potential Emissions

Potential emissions were based on future battery capacity. MAFB plans to have the capacity for 500 batteries in future years. Potential emissions of sulfuric acid are 16 pounds per year.

References

1. U.S. Environmental Protection Agency, Compilation of Air Pollutant Emission Factors – Volume I: Stationary Point and Area Sources (AP-42), Section 7.15, April 1981 (Reformatted January 1995).

Client:	Malmstrom AFB	**Date:**	10/4/2000
Location:	Battery Maintenance	**Emissions:**	Actual and Potential
Subject:	Sulfuric Acid Batteries	**Calc by:**	*SBH*

Parameters	*Quantity*	*Unit*	*Basis*
Acid Mist Emission Factor	32.4	lb acid/1000 batteries	AP-42 (USEPA 1990 b, Section 7.15) emission factor for emissions of acid mist from lead-acid battery production "formation" step.
Number of Batteries Drained in 1999	35		Malmstrom AFB
Maximum Battery Capacity planned for future years	500		Malmstrom AFB
Sulfuric acid usage	75	gallons	Malmstrom AFB
Control Efficiency (Control Equipment is lab hoods vented to air)	0	%	

Calculate actual emissions based on batteries drained in 1999:

= 32.4 lb acid/1000 batteries x 35 batteries =	**1.134**	lbs sulfuric acid emitted in 1999 (actual)
= 1.134 lbs / 2000 lb/ton =	**0.001**	tons sulfuric acid emitted in 1999 (acutal)

Calculate potential emissions based on future battery capacity (500 batteries)

= 32.4 lb acid/1000 batteries x 500 batteries =	**16.2**	**lbs sulfuric acid emitted (potential)**
= 16.2 lbs / 2000 lb/ton =	**0.01**	**tons sulfuric acid emitted (potential)**

SECTION 27

SURFACE COATINGS

Source Description

Surface coating operations in a paint booth are completed by the Sign Shop at Building 471, Allied trades at Building 870, Auto hobby at Building 1248, and Missile Corrosion at Building 3075. Surface coating includes the application of primers and paints and the use of some thinners. Painting operations in Buildings 47 and 1248 are applied through conventional spray guns. Building 3075 uses a high volume low pressure spray gun and Building 870 only uses aerosol cans.

Emissions of concern include VOC and organic HAP emissions resulting from evaporation of the solvent portion of the paint during drying, and inorganic HAP and particulate emissions resulting from solids contained in the portion of the coating which is sprayed but fails to deposit on the substrate. The applicable two-digit SIC Code is 97 for National Security and International Affairs. The auto hobby coating operations fall under SCC Code 4-02-016-25 Surface Coating of Automobile and Light Trucks, top-coat operations. The applicable SCC Codes for the other operations are 4-02-025-01, Surface Coating of Miscellaneous Metal Parts, Coating Operation.

Actual Emissions

Surface coating emissions are calculated through a mass balance approach. The entire VOC and organic HAP portion of the coating is assumed to evaporate after application. Therefore the volume applied (VC) is multiplied by the density (D) to obtain the mass applied. Annual usages were obtained from the Hazmart database and from area personnel. Once the mass of coating applied was calculated, the weight fraction of the individual HAP or VOC content (WP) was multiplied by the mass to obtain pounds of pollutant emitted. A correction was applied to account for the presence of VOC/HAP control equipment where applicable (CE). Where a range of percent weight was given, the maximum was introduced into the emission calculation in order to be conservative.

$$Epol = VC * D * (WP/100) * [1-(CE/100)]$$

See the attached spreadsheet for further description of completed calculations and a summary of emissions associated with surface coating.

Potential Emissions

Potential emissions were calculated as discussed in Section 37.2 of the AEI Guidance Document. In essence, surface coating is a maintenance activity in support of infrastructure operations. Therefore, because the base operations were approximately 2,080 hours annually, this was scaled up by a factor of 4.2 to reach potential base operating hours of 8,760 annually. Actual emissions associated with surface coating were multiplied by a factor of 4.2 to obtain potential surface coating emissions.

References

1. U.S. Air Force, Application and Removal of Organic Coatings, Aerospace and Non-Aerospace Equipment, Technical Order 1-1-8, September 1989.

2. U.S. Environmental Protection Agency, Guideline Series: Control of Volatile Organic Compound Emissions from Coating Operations of Aerospace Manufacturing and Rework Operations, EPA-453/R-97-004, December 1997.

3. Emissions Inventory Improvement Program (EIIP), Volume II: Chapter 7, "Preferred and Alternative Methods for Estimating Air Emissions from Surface Coating Operations," October 1997.

4. Ron Joseph & Associates, Inc., Environmental Paints and Coatings Training Program for United States Air Force.

5. U.S. Environmental Protection Agency, Compilation of Air Pollutant Emission Factors - Volume I: Stationary Point and Area Sources (AP-42), Section 4.2.2.1, April 1998 (Reformatted January 1995).

6. U.S. Air Force Bioenvironmental Engineering Division, Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations, Brooks Air Force Base, TX 78235-5114, May 1999.

Client:	Malmstrom AFB	**Date:**	8/24/00
Location:	Bldgs 471, 870, 1248, & 3075	**Emission:**	Actual and Potential Summary
Subject:	Surface Coatings	**Calc. by:**	*SSR*

Surface Coating Actual Emissions Summary

	tons/yr
VOC	0.73
PM	0.0027
Total HAPs	0.29
Xylenes	0.24
Ethyl Benzene	0.007
MEK	0.013
Toluene	0.02
MIBK	0.0007
Ethylene Glycol	0.004
Styrene	0.0006
Cobalt	0.00006

Surface Coating Potential Emissions Summary

	tons/yr
VOC	3.08
PM	0.01
Total HAPs	1.20
Xylenes	1.02
Ethyl Benzene	0.03
MEK	0.05
Toluene	0.07
MIBK	0.003
Ethylene Glycol	0.02
Styrene	0.002
Cobalt	0.0002

Client: Malmstrom AFB
Location: Building 1248
Subject: Surface Coatings

Date: 8/24/00
Emission: Actual and Potential
Calc. by: *SSR*

Variables (VOC and Organic HAPS):

Method 1 (weight percentage of VOC/HAP is known)

1) Emissions of a particular polluant (VOC or organic HAP in lb/yr) = **E**
2) Volume of coating applied (gal/yr) = **VC**
3) Density of the coating (lb/gal) = **D**
4) Weight percentatge of the pollutant in the coating (%) = **WP**
5) Efficiency of the PM control system (%) = **CE**

E = VC * D * (WP/100)

Variables (PM and Inorganic HAPS):

9) Estimated transfer efficiency of the spray coating operation = **TE**

E = VC * D * (WP/100) *[1-(TE/100)] * [1-(CE/100)]

Coating NSN #	Name of Coating	VC	D	Lbs of Coating Applied (VC*D)	Method of application	TE	Emission Control Type	CE	Constituent	WP	E (lb/yr)
	Representative Basecoat	12	9.6025	115.23	Conventional Spray Gun	30	Filter	99	VOC content	100	115.23
									Solids content	75	0.605
									methyl ethyl ketone	25	28.81
									toluene	15	17.28
									xylene	10	11.52
	Representative Urethane/Acrylic	12	9.6025	115.23	Conventional Spray Gun	30	Filter	99	VOC content	62	71.44
									Solids content	45	0.363
									styrene	1	1.15
									methyl ethyl ketone	10	11.52
									ethylbenzene	5	5.76
									xylene	40	46.09

Usage information supplied by Cliff Holmes (8/23/00). Because the users supply their own paint no records are available through the Hazmart database.
The representative basecoat is a combined worst-case scenario between two basecoats used at Bldg 920 (NSN #s 8010PDBU14308 & 8010PDBUXXX)
The representative urethane/acrylic is a combined worst-case scenario between four urethanes used at Bldg 920 (NSN #s 8010PDAU82, 8010PDCU202, 8010PDCU2042, & 8040PDCU2021).
When the specific gravity of a coating was not in the Hazmart database a specific gravity of 1.15 for non-aerosol paints.

Note: PM10 assumed to be equal to PM emissions

Client: Malmstrom AFB
Location: Building 1248
Subject: Surface Coatings

Date: 8/24/00
Emission: Actual and Potential
Calc. by: *SSR*

Emissions Summary

	Tons	
Pollutant	**Actual**	**Potential**
VOC	0.09	0.39
PM	0.000	0.002
Total HAPs	0.04	0.18
Xylene	0.029	0.121
Styrene	0.001	0.002
Methyl ethyl ketone	0.006	0.024
Ethylbenzene	0.003	0.012
Toluene	0.005	0.021

Client: Malmstrom AFB
Location: Building 870
Subject: Surface Coatings

Date: 8/24/00
Emission: Actual and Potential
Calc. by: *SSR*

Variables (VOC and Organic HAPS):

Method 1 (weight percentage of VOC/HAP is known)

1) Emissions of a particular polluant (VOC or organic HAP in lb/yr) = **E**
2) Volume of coating applied (gal/yr) = **VC**
3) Density of the coating (lb/gal) = **D**
4) Weight percentatge of the pollutant in the coating (%) = **WP**
5) Efficiency of the PM control system (%) = **CE**

E = VC * D * (WP/100)

Variables (PM and Inorganic HAPS):

9) Estimated transfer efficiency of the spray coating operation = **TE**

E = VC * D * (WP/100) *[1-(TE/100)] * [1-(CE/100)]

Coating NSN #	Name of Coating	VC	D	Lbs of Coating Applied (VC*D)	Method of application	TE	Emission Control Type	CE	Constituent [(a)]	WP	E (lb/yr)
8010-00-F00-7671	Aerosol Paint	1.5	8.35	12.525	Spray Can	30	Filter	99	VOC content	77	9.64
									Solids content	23	0.020
									methyl ethyl ketone	5	0.63
									xylene	10	1.25
8010-01-333-1441-1	Enamel Paint, Olive Drab	1.5	7.4315	11.14725	Brush	100	Filter	99	VOC content	90.00	10.03
									Solids content	10.00	0.00
									methyl isobutyl ketone	2.92	0.33
									xylene	22.07	2.46
8010-P0-8643	Window Paint Black	0.375	8.35	3.13125	Spray Can	30	Filter	99	VOC Content	45	1.409
									Solids Content	55	0.01
8010-P-1601	Aerosol Paint, Black	0.375	8.35	3.13125	Spray Can	30	Filter	99	VOC Content	95	3
									Solids Content	5	0.001
									methyl ethyl ketone	10	0.31
									methyl isobutyl ketone	5	0.16
									toluene	5	0.16
									xylene	30	0.94
8010-P2-0033	Aerosol Paint, Flat Black	11.63	6.5965	76.717295	Spray Can	30	Filter	99	VOC Content	55	42
									Solids Content	45	0.24
									toluene	20	15.34
									xylene	5	3.84

Client: Malmstrom AFB
Location: Building 870
Subject: Surface Coatings

Date: 8/24/00
Emission: Actual and Potential
Calc. by: *SSR*

8010-P-2101	Aerosol Paint	0.09	8.35	0.7515	Spray Can	30	Filter	99	VOC Content	50	0.38
									Solids Content	50	0.003
									methyl ethyl ketone	8	0.06
									ethylbenzene	2	0.02
									methyl isobutyl ketone	3	0.02
									xylene	10	0.08
8010-PT-41	Enamel Paint	0.75	8.35	6.2625	Spray Can	30	Filter	99	VOC Content	45	2.8
									Solids Content	55	0.02
									methyl ethyl ketone	5	0.31
									methyl isobutyl ketone	15	0.94
									toluene	10	0.63

(a) Chemical compositions taken from Hazmart database.
When the specific gravity of a coating was not in the Hazmart database a specific gravity of 1.0 was applied for spray cans.

Note: PM10 assumed to be equal to PM emissions

Client: Malmstrom AFB
Location: Building 870
Subject: Surface Coatings

Date: 8/24/00
Emission: Actual and Potential
Calc. by: *SSR*

Emissions Summary

	Tons	
Pollutant	**Actual**	**Potential**
VOC	0.03	0.15
PM	0.0002	0.0006
Total HAPs	0.01	0.06
Xylene	0.004	0.018
Ethylbenzene	0.00001	0.00003
Toluene	0.008	0.034
Methyl isobutyl ketone	0.001	0.003
Methyl ethyl ketone	0.001	0.003

Client: Malmstrom AFB
Location: Building 3075
Subject: Surface Coatings

Date: 8/24/00
Emission: Actual and Potential
Calc. by: *SSR*

Variables (VOC and Organic HAPS):

Method 1 (weight percentage of VOC/HAP is known)

1) Emissions of a particular polluant (VOC or organic HAP in lb/yr) = **E**
2) Volume of coating applied (gal/yr) = **VC**
3) Density of the coating (lb/gal) = **D**
4) Weight percentatge of the pollutant in the coating (%) = **WP**
5) Efficiency of the PM control system (%) = **CE**

E = VC * D * (WP/100)

Variables (PM and Inorganic HAPS):

9) Estimated transfer efficiency of the spray coating operation = **TE**

E = VC * D * (WP/100) *[1-(TE/100)] * [1-(CE/100)]

Coating NSN #	Name of Coating	VC	D	Lbs of Coating Applied (VC*D)	Method of application	TE	Emission Control Type	CE	Constituent [a]	WP	E (lb/yr)
8010-00-181-8080	Paint Thinner	2	7.0975	14.195	HVLP	65	Filter	99	VOC content	100	14.20
									Solids content	0	0.000
									toluene	10.5	1.49
									methyl ethyl ketone	30.5	4.33
									xylene	7	0.99
8010-00-297-0585	Enamel Paint	3	9.185	27.555	HVLP	65	Filter	99	VOC content	46.00	12.68
									Solids content	54.00	0.05
8010-00-298-2287	Enamel Paint, Blue 15045	3	9.6025	28.8075	HVLP	65	Filter	99	VOC Content	45	12.963
									Solids Content	55	0.06
									methyl ethyl ketone	5	1.44
									ethylbenzene	5	1.44
									xylene	10	2.88
8010-00-298-2298	Enamel Paint, Gray 16376 Pratt & Lambert	12	9.519	114.228	HVLP	65	Filter	99	VOC Content	49	56
									Solids Content	51	0.20
									ethylbenzene	5	6
									xylene	10	11
8010-00-298-2298	Enamel Paint, Gray 16376 Sherwin-Williams	6	9.519	57.114	HVLP	65	Filter	99	VOC Content	49	28
									Solids Content	51	0.10
									ethylene glycol	2	1.14

Client: Malmstrom AFB
Location: Building 3075
Subject: Surface Coatings

Date: 8/24/00
Emission: Actual and Potential
Calc. by: *SSR*

									xylene	2	1.14
8010-00-298-2304	Enamel Paint	5	9.6025	48.0125	HVLP	65	Filter	99	VOC Content	40	19
									Solids Content	60	0.10
									methyl ethyl ketone	5	2.40
									xylene	10	4.80
8010-00-530-5565	Enamel Paint Grey, Columbia	41	11.69	479.29	HVLP	65	Filter	99	VOC Content	48.3	231
									Solids Content	51.7	0.87
									xylene	1.17	5.61
8010-00-530-5565	Enamel Paint Grey, Sherwin-Williams	24	11.69	280.56	HVLP	65	Filter	99	VOC Content	48.3	136
									Solids Content	51.7	0.51
									xylene	2	5.61
8010-00-530-5567	Enamel Paint, Green	9	9.6025	86.4225	HVLP	65	Filter	99	VOC Content	35	30
									Solids Content	65	0.20
									methyl ethyl ketone	5	4.32
									xylene	5	4.32
8010-00-582-5382	Enamel Paint, Flat Black	2	9.6025	19.205	HVLP	65	Filter	99	VOC Content	88	17
									Solids Content	12	0.01
									methyl ethyl ketone	3.75	0.72
									toluene	28.46	5.47
									xylene	1.25	0.24
8010-00-641-0427	Nonslip Compound, Black	7	9.6025	67.2175	HVLP	65	Filter	99	VOC Content	50	34
									Solids Content	50	0.12
8010-00-664-4761	Enamel Paint, Columbia	10	11.022	110.22	HVLP	65	Filter	99	VOC Content	28.13	31
									Solids Content	71.87	0.28
									ethylene glycol	6.06	6.68
8010-00-664-4761	Enamel Paint, Niles	1	11.022	11.022	HVLP	65	Filter	99	VOC Content	28.13	3.1
									Solids Content	71.87	0.03
									cobalt	1	0.11
									xylene	4	0.44
8010-00-664-4761	Enamel Paint, Sherwin-Williams	1	11.022	11.022	HVLP	65	Filter	99	VOC Content	28.13	3.1
									Solids Content	71.87	0.03
									xylene	2	0.22

Client: Malmstrom AFB
Location: Building 3075
Subject: Surface Coatings

Date: 8/24/00
Emission: Actual and Potential
Calc. by: *SSR*

8010-01-336-3032	Polyurethane Coating, Deft	1	12.358	12.358	HVLP	65	Filter	99	VOC Content	65.8	8.1
									Solids Content	34.2	0.01
									xylene	0.07	0.009
									ethylbenzene	0.03	0.004
8010-01-336-3032	Polyurethane Coating, Deft II	1	12.358	12.358	HVLP	65	Filter	99	VOC Content	65.8	8.1
									Solids Content	34.2	0.01
8010-01-139-3942	Polyurethane Blue	2	9.6025	19.205	HVLP	65	Filter	99	VOC Content	38	7.3
									Solids Content	62	0.04
									xylene	1	0.192
									ethylbenzene	1	0.192
8010-01-441-5940	Paint Thinner	9	6.513	58.617	HVLP	65	Filter	99	VOC Content	100	58.6
									Solids Content	0	0.00
8010-P-1-0076	Enamel Paint, Polyurethane Base	4	9.6025	38.41	HVLP	65	Filter	99	VOC Content	100	38.4
									Solids Content	58	0.08
									xylene	1.17	0.449
8010-P-1-3711	Enamel Paint, Polyurethane Base	3	9.6025	28.8075	HVLP	65	Filter	99	VOC Content	100	28.8
									Solids Content	63	0.06
									xylene	100	28.808

(a) Chemical compositions taken from Hazmart database.
When the specific gravity of a coating was not in the Hazmart database a specific gravity of 1.15 was applied for non-aerosol paints.

Note: PM10 assumed to be equal to PM emissions

Emissions Summary

	Tons	
Pollutant	**Actual**	**Potential**
VOC	0.39	1.63
PM	0.00	0.006
Total HAPs	0.05	0.22
Xylene	0.034	0.141
Ethylbenzene	0.004	0.015
Toluene	0.003	0.015
Ethylene glycol	0.004	0.016
Methyl ethyl ketone	0.007	0.028
Cobalt	0.00006	0.00023

Client: Malmstrom AFB
Location: Building 471
Subject: Surface Coatings

Date: 8/24/00
Emission: Actual and Potential
Calc. by: *SSR*

Variables (VOC and Organic HAPS):

Method 1 (weight percentage of VOC/HAP is known)

1) Emissions of a particular polluant (VOC or organic HAP in lb/yr) = **E**
2) Volume of coating applied (gal/yr) = **VC**
3) Density of the coating (lb/gal) = **D**
4) Weight percentatge of the pollutant in the coating (%) = **WP**
5) Efficiency of the PM control system (%) = **CE**

E = VC * D * (WP/100)

Variables (PM and Inorganic HAPS):

9) Estimated transfer efficiency of the spray coating operation = **TE**

E = VC * D * (WP/100) *[1-(TE/100)] * [1-(CE/100)]

Coating NSN #	Name of Coating	VC	D	Lbs of Coating Applied (VC*D)	Method of application	TE	Emission Control Type	CE	Constituent [a]	WP	E (lb/yr)
8010-00-721-9743	Red Enamel Paint	0.125	8.35	1.04	Spray Can	30	Filter	99	VOC content	62.11	0.65
									Solids content	37.89	0.003
									toluene	25.22	0.26
									xylene	1.58	0.02
	Rich Brown Paint	36	9.6025	345.69	Conventional Spray Gun	30	Filter	99	VOC content	100	345.69
									Solids content	60	1.452
									xylene	1.17	4.04
	Xylene	12	7.26	87.17	Conventional Spray Gun	30	Filter	99	VOC content	100	87.17
									Solids content	0	0.000
									xylene	100	87.17

Usage information regarding Rich Brown Paint and xylene usage were supplied by Cliff Holmes (8/23/00). Component information was obtained from Hazmart database. When the specific gravity of a coating was not in the Hazmart database a specific gravity of 1.0 was applied for spray cans and 1.15 for non-aerosol paints.

Note: PM10 assumed to be equal to PM emissions

Emissions Summary

	Tons	
Pollutant	Actual	Potential
VOC	0.22	0.91
PM	0.001	0.003
Total HAPs	0.18	0.74
Xylene	0.176	0.740
Toluene	0.001	0.003

SECTION 28

VEHICLE MAINTENANCE EXHUAST

Source Description

Motor vehicles at MAFB consist primarily of personal, government owned, utility type vehicles, and AGE. These vehicles all have engines that burn JP-8, gasoline or diesel fuel. They are included in the two-digit standard industrial classification code (SIC) 97 for National Security and International Affairs.

Actual Emissions

The vehicles described above are mobile sources, and therefore have not been included as sources in this air emissions inventory. However, there are shops at MAFB where engines are tested following maintenance activities to assess engine operation. Usually in winter months, the exhaust from the engine is hooked to a flexible hose, connected to a blower, which acts as a vacuum system and discharges the exhaust through building vents, thereby creating a stationary internal combustion engine.

Based on the site visits to these shops and discussions with base personnel, it was concluded that the types of vehicles operated would fall most generally into the following categories. Specific test duration and frequency information, or in some cases the number of vehicles serviced each year, was provided by individual shop personnel on a case by case basis. In general, the hours of operation were multiplied by an emission factor based on fuel type used, and engine type (determined largely by vehicle type). Specific shop information is included in the calculation spreadsheet.

Category	Description
Generator	Stationary Internal Combustion Engines < 600 hp
LDGV	Light Duty Gasoline Vehicle – Primarily used for transportation. Holding 12 passengers or less.
HDCV	Heavy Duty Diesel Construction Vehicle – Miscellaneous
AGE	Aerospace Ground Equipment- Miscellaneous

[Note: An engine baker located at Building 870 was not utilized in 1999, nor is it expected to be operated in the future.]

Potential Emissions

Potential emissions for miscellaneous chemical usage were calculated by multiplying actual emissions by the potential hours of operation each year (8,760) divided by the actual operating hours for 1999 (2,080).

Reference

1. U.S. Environmental Protection Agency, Compilation of Air Pollutant Emission Factors, Volume II: Mobile Sources, September 1985.

Client:	Malmstrom AFB	**Date:**	10/27/2000
Location:	Base-wide	**Emissions:**	Actual
Subject:	Vehicle/Engine Emissions from Maintenance Bays	**Calc by:**	*TLW*

Parameter	Quantity	Units	Basis
1. Emission Factors (Diesel Reciprocating up to 600 hp)			
PM/PM_{10}	2.2	$lb/10^3$ hp-hr	Table 29-3, AEI Guidance Document
NO_x	31	$lb/10^3$ hp-hr	Table 29-3, AEI Guidance Document
SO_x	2.05	$lb/10^3$ hp-hr	Table 29-3, AEI Guidance Document
CO	6.68	$lb/10^3$ hp-hr	Table 29-3, AEI Guidance Document
VOC	2.5	$lb/10^3$ hp-hr	Table 29-3, AEI Guidance Document
Acetaldehyde	0.0054	$lb/10^3$ hp-hr	Table 29-3, AEI Guidance Document
Acrolein	0.000648	$lb/10^3$ hp-hr	Table 29-3, AEI Guidance Document
Benzene	0.0065	$lb/10^3$ hp-hr	Table 29-3, AEI Guidance Document
1,3-Butadiene	0.000274	$lb/10^3$ hp-hr	Table 29-3, AEI Guidance Document
Formaldehyde	0.0083	$lb/10^3$ hp-hr	Table 29-3, AEI Guidance Document
Naphthalene	0.000594	$lb/10^3$ hp-hr	Table 29-3, AEI Guidance Document
Polycyclic Aromatic Hydrocarbons	0.0012	$lb/10^3$ hp-hr	Table 29-3, AEI Guidance Document
Toluene	0.0029	$lb/10^3$ hp-hr	Table 29-3, AEI Guidance Document
Xylenes	0.002	$lb/10^3$ hp-hr	Table 29-3, AEI Guidance Document
2. Emission Factors (Diesel - Heavy Duty Construction Equipment, Misc.)			
PM/PM_{10}	0.139	lb/hr	Table II-7.1, Miscellaneous. AP-42, Volume II, Mobile Sources.
NO_x	1.691	lb/hr	Table II-7.1, Miscellaneous. AP-42, Volume II, Mobile Sources.
SO_x	0.143	lb/hr	Table II-7.1, Miscellaneous. AP-42, Volume II, Mobile Sources.
CO	0.675	lb/hr	Table II-7.1, Miscellaneous. AP-42, Volume II, Mobile Sources.
VOC (as HC)	0.152	lb/hr	Table II-7.1, Miscellaneous. AP-42, Volume II, Mobile Sources.
Aldehydes	0.031	lb/hr	Table II-7.1, Miscellaneous. AP-42, Volume II, Mobile Sources.
3. Emission Factors (Light Duty Gasoline Vehicle - LDGV, Idle Mode)			
PM/PM_{10}	0	g/min	Table 1.1.3 (1990 to present), AP-42, Volume II, Mobile Sources.
NO_x	0.08	g/min	Table 1.1.3 (1990 to present), AP-42, Volume II, Mobile Sources.
SO_x	0	g/min	Table 1.1.3 (1990 to present), AP-42, Volume II, Mobile Sources.
CO	1.48	g/min	Table 1.1.3 (1990 to present), AP-42, Volume II, Mobile Sources.
VOC (as HC)	0.09	g/min	Table 1.1.3 (1990 to present), AP-42, Volume II, Mobile Sources.
4. Emission Factors (JP-8 Reciprocating)			
PM/PM_{10}	42.5	$lb/10^3$ gal	Table 29-3, AEI Guidance Document
NO_x	604	$lb/10^3$ gal	Table 29-3, AEI Guidance Document
SO_x	6.62	$lb/10^3$ gal	Per the AEI Guidance Document
CO	130	$lb/10^3$ gal	Table 29-3, AEI Guidance Document
VOC	49.3	$lb/10^3$ gal	Table 29-3, AEI Guidance Document
Acetaldehyde	0.105	$lb/10^3$ gal	Table 29-3, AEI Guidance Document
Acrolein	0.013	$lb/10^3$ gal	Table 29-3, AEI Guidance Document
Benzene	0.128	$lb/10^3$ gal	Table 29-3, AEI Guidance Document
1,3-Butadiene	0.005	$lb/10^3$ gal	Table 29-3, AEI Guidance Document
Formaldehyde	0.162	$lb/10^3$ gal	Table 29-3, AEI Guidance Document
Naphthalene	0.012	$lb/10^3$ gal	Table 29-3, AEI Guidance Document
Polycyclic Aromatic Hydrocarbons	0.023	$lb/10^3$ gal	Table 29-3, AEI Guidance Document
Toluene	0.056	$lb/10^3$ gal	Table 29-3, AEI Guidance Document
Xylenes	0.039	$lb/10^3$ gal	Table 29-3, AEI Guidance Document

Building	Engine Type	Fuel Type	Loading Factor (% of Maximum Power, hp)	PO (hp)	Maximum Exhausts	Average Number of Exhausts in Use	Number of Runs/Exhaust/		Duration/Run		Time Conversion Factor	OT (hrs)	Factor for Potential Emissions
Building 200	Generator	Diesel	100	235	1	1	1	month	1.0	hour	12	12	4.21
Building 450, AGE Maintenance	Generator	Diesel	100	1.5	1	1	2	week	1.0	hour	52	104	4.21
Building 450, AGE Maintenance	AGE Exhaust	Diesel	na	na	2	1	1	Month (Seasonal)	0.5	hour	6	6	4.21
Building 882	Heavy Duty/ Front End Loaders	Diesel	na	na	10	3	1066	vehicles	0.5	hour/vehicle	--	533	4.21
Building 850, Tire Shop	Heavy Duty/ Hum-V	Diesel	na	na	3	1	2	week	0.5	hour	52	104	4.21
Building 870	Hum-V/Heavy Equipment	Diesel	na	na	4	2	1066	vehicles	0.5	hour/vehicle	--	533	4.21
Building 1448	Over Road Tractors/Vans/ Buses	Diesel	na	na	6	4	2	Day (Seasonal)	0.5	hour	180	600	4.21
Building 1440 (Hangar 6)	Semi-Trucks	Diesel	na	na	4	2	2	week	0.5	hour	52	208	4.21
Building 870	Explorers/ Expeditions	Gasoline	na	na	12	5	3198	vehicles	0.5	hour/vehicle	--	1599	4.21
Building 850, Tire Shop	Personal Vehicles	Gasoline	na	na	3	1	2	week	0.5	hour	52	94	4.21
Building 1222, Outdoor Recreation	Recreational Boats	Gasoline	na	na	1	1	4	month	1.0	hour	12	48	4.21
BX Gas Station Service Center	Personal Vehicles	Gasoline	na	na	4	2	1	Day (Seasonal)	2.0	hour	180	1440	4.21
Building 450, AGE Maintenance	AGE Exhaust	JP-8	na	na	2	1	1	week	1.0	hour	52	208	4.21

1) Frequency and duration of engine operation (or number of vehicles serviced and duration of operation) was supplied by base personnel where available. Contacts:

Building 200	Mr. Jim Chestnutt, ext. 6124
Building 450	SSgt. Kangas, ext. 3309
Building 882	TSgt. Bayus, ext. 6083
Building 850	TSgt. Bayus, ext. 6083
Building 870	TSgt. Bayus, ext. 6083
Building 1448	SSgt. Pittman, ext. 2210
BX Gas Station	Mr. Paul Clark, ext. 761-7333

2) For areas where a base contact was not available (1440) or where servicing frequency and/or duration were not available (850, 870, 882) an average frequency of 2 times per week per exhaust and/or average of 30 minute duration were u engineering estimates.

3) Seasonal indicates that exhausters are only utilized in winter months; therefore, 6 months was used as a conservative estimate.

4) Calculations were completed using the following equations:

Equation for Stationary IC engines (diesel)
(Generators < 600 hp)

$E_{pol} = [PO * (LF/100) * OT]/1000 * EF$

E_{pol} = Emissions of a particular pollutant (tons/yr)
PO = Rated power output of engine (hp)
LF = Loading Factor (% of maximum power)
OT = Operating time of the engine (hr)
1000 = Factor for converting "hp-hr" to "10^3 hp-hr"
EF = Emission Factor (lb/10^3 hp-hr)
2000 = Factor for converting lbs to tons

Equation for Diesel Vehicles (HDCV):

$E_{pol} = OT * EF / 2000$

E_{pol} = Emissions of a particular pollutant (tons/yr)
OT = Operating time of the engine (hr)
EF = Emission Factor (lb/hr)
2000 = Factor for converting lbs to tons

Equation for GasolineVehicles (LDGV):

$E_{pol} = OT * EF * 60 / 454 / 2000$

E_{pol} = Emissions of a particular pollutant (tons/yr)
EF = Emission Factor (g/min)
OT = Operating time of the engine (hr)
60 = Factor for converting minutes to hours
454 = factor for converting grams to pounds
2000 = Factor for converting lbs to tons

Equation for JP-8 Reciprocating Engine (AGE):

$E_{pol\,(tons)} = EF * 250 / 1000 / 2000$

E_{pol} = Emissions of a particular pollutant (tons/yr)
EF = Emission Factor (lb/10^3 gal)
250 = Gallons JP-8 used in 1999
1000 = Factor for converting "gal" to "10^3 gal"
2000 = Factor for converting lbs to tons

Criteria Pollutant Emissions

Shop	Tons per Year, Actual				
	PM/PM_{10}	NO_x	SO_x	CO	VOC
Building 200	3.10E-03	4.37E-02	2.89E-03	9.42E-03	3.53E-03
Building 450, AGE Maintenance	1.72E-04	2.42E-03	1.60E-04	5.21E-04	1.95E-04
Building 450, AGE Maintenance	4.17E-04	5.07E-03	4.29E-04	2.03E-03	4.56E-04
Building 882	3.70E-02	4.51E-01	3.81E-02	1.80E-01	4.05E-02
Building 850, Tire Shop	7.23E-03	8.79E-02	7.44E-03	3.51E-02	7.90E-03
Building 870	3.70E-02	4.51E-01	3.81E-02	1.80E-01	4.05E-02
Building 1448	4.17E-02	5.07E-01	4.29E-02	2.03E-01	4.56E-02
Building 1440 (Hangar 6)	1.45E-02	1.76E-01	1.49E-02	7.02E-02	1.58E-02
Building 870	0.00E+00	8.45E-03	0.00E+00	1.56E-01	9.51E-03
Building 850, Tire Shop	0.00E+00	4.95E-04	0.00E+00	9.15E-03	5.57E-04
Building 1222, Outdoor Recreation	0.00E+00	2.54E-04	0.00E+00	4.69E-03	2.85E-04
BX Gas Station Service Center	0.00E+00	7.61E-03	0.00E+00	1.41E-01	8.56E-03
Building 450, AGE Maintenance	5.31E-03	7.55E-02	8.28E-04	1.63E-02	6.16E-03
Totals, Actual (tpy) :	**0.15**	**1.82**	**0.15**	**1.01**	**0.18**
Totals, Potential (tpy) :	**0.62**	**7.65**	**0.61**	**4.24**	**0.76**

Hazardous Air Pollutant Emissions

Shop	HAPs Tons per Year									
	Acetaldehyde	Acrolein	Benzene	1,3-Butadiene	Formaldehyde	Naphthalene	Polycyclic Aromatic Hydrocarbons	Toluene	Xylenes	
Building 200	7.61E-06	9.14E-07	9.17E-06	3.86E-07	1.17E-05	8.38E-07	1.69E-06	4.09E-06	2.82E-06	
Building 450, AGE Maintenance	4.21E-07	5.05E-08	5.07E-07	2.14E-08	6.47E-07	4.63E-08	9.36E-08	2.26E-07	1.56E-07	
Building 450, AGE Maintenance	9.30E-05	–	–	–	–	–	–	–	–	
Building 882	8.26E-03	–	–	–	–	–	–	–	–	
Building 850, Tire Shop	1.61E-03	–	–	–	–	–	–	–	–	
Building 870	8.26E-03	–	–	–	–	–	–	–	–	
Building 1448	9.30E-03	–	–	–	–	–	–	–	–	
Building 1440 (Hangar 6)	3.22E-03	–	–	–	–	–	–	–	–	
Building 870	–	–	–	–	–	–	–	–	–	
Building 850, Tire Shop	–	–	–	–	–	–	–	–	–	
Building 1222, Outdoor Recreation	–	–	–	–	–	–	–	–	–	
BX Gas Station Service Center	–	–	–	–	–	–	–	–	–	
Building 450, AGE Maintenance	1.31E-05	1.63E-06	1.60E-05	6.25E-07	2.03E-05	1.50E-06	2.88E-06	7.00E-06	4.88E-06	**Totals:**
Totals, Actual (tpy):	**0.03**	**2.6E-06**	**2.6E-05**	**1.0E-06**	**3.3E-06**	**2.4E-06**	**4.7E-06**	**1.1E-05**	**7.9E-06**	**3.09E-02**
Totals, Potential (tpy):	**0.13**	**1.1E-05**	**1.1E-04**	**4.3E-06**	**1.4E-04**	**1.0E-05**	**2.0E-05**	**4.8E-05**	**3.3E-05**	**1.30E-01**

SECTION 29

WELDING

Source Description

Welding operations are completed at the Metal Shop located at Building 471, at the Red Horse operations located in Building 1447 and at Building 1890. Building 471 also manages and operates several portable units that re used throughout the base. Building 1890 is equipped with an HEPA filter to collect emissions during welding operations. The other buildings are not supplied with emission control equipment. The applicable two-digit SIC is 97 for National Security and International Affairs. Applicable SCC Codes are included under 3-09-051, Shielded Metal Arc Welding (SMAW) and 3-09-052, Gas Metal Arc Welding (GMAW). Individual electrode types have an applicable extension of this SCC Code:

Electrode	SCC
E7018	3-09-051-44
E6010	3-09-051-28
E6011	3-09-051-32
ER705	3-09-052-54

Actual Emissions

Actual emissions were calculated using electric arc welding emission factors published in Section 12.19 of AP-42 and included in Tables 33-1 and 33-2 of the AEI Guidance Document. Pollutants of concern include limited inorganic HAPs and particulate matter. Emissions were calculated by multiplying the mass of electrodes consumed (EC) by the appropriate emission factor (EF), as follows:

$$E_{pol} = EC * EF * (100\text{-}CE)/100$$

For example, Mr. Underwood reported that, in 1999, 10 pounds of electrode E7018 was used in shielded metal arc welding (SMAW) operations conducted at Building 1890. Particulate and specific HAP emissions were then calculated using appropriate emission factors in the following manner applying a 99% control efficiency for the presence of the HEPA filters:

$$E_{cr} = EC * EF_{Cr} * (100\text{-}CE)/100$$

$$E_{cr} = 10 \text{ lbs E7018} * 0.006 \text{ lb Cr/lb E7018} * (100\text{-}99)/100 = 6 \times 10^{-7} \text{ lb Cr emitted in 1999.}$$

Additional calculations and summary of emissions are included in the attached calculation worksheet.

Potential Emissions

Potential emissions were calculated as discussed in Section 37.2 of the AEI Guidance Document. In essence, welding is a maintenance activity in support of infrastructure operations. Therefore, because the base operations were approximately 2,080 hours annually, this was scaled up by a factor of 4.2 to reach potential base operating hours of 8,760 annually.

Reference

1. U.S. Air Force Bioenvironmental Engineering Division, Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations, Brooks Air Force Base, TX 78235-5114, May 1999.

2. U.S. Environmental Protection Agency, Compilation of Air Pollutant Emission Factors – Volume I: Stationary Point and Area Sources (AP-42), Section 12.19, January 1995.

Client: Malmstrom AFB
Location: Buildings 471, 1447, 1450, and 1890
Subject: Welding

Date: 8/24/2000
Emissions: Actual and Potential
Calc. by: *SSR*

Basis:
1. Emissions of Pollutant = **E**
2. Total mass of electrode used (1,000 lb/yr) = **EC**
3. Emission Factor (lb/1,000 lb) = **EF[a]**
4. Control Equipment Efficiency = **CEF**

E = EC*EF*(100-CEF)/100

Building Location	Type of Welding Process	Electrode Type	EC (lbs)	Control Equipment	CEF (%)	EFhap (lb/1,000 lb) [a]				EF_{pm-10} (lb/1,000 lb)[a]
						Cr	Co	Mn	Ni	
471	MIG/TIG	Coiled Wire[b]	120	None	0	0.001	0.001	0.318	0.001	5.2
471	SMAW	6010	200	None	0	0.003	---	0.991	0.004	25.6
471	SMAW	6011	200	None	0	0.005	0.001	0.998	0.005	38.4
471	SMAW	7018	200	None	0	0.006	0.001	1.03	0.002	18.4
471	Portable SMAW	6010	400	None	0	0.003	---	0.991	0.004	25.6
471	Portable SMAW	6011	400	None	0	0.005	0.001	0.998	0.005	38.4
471	Portable SMAW	7018	400	None	0	0.006	0.001	1.03	0.002	18.4
1447	MIG	Coiled Wire[b]	66	None	0	0.001	0.001	0.318	0.001	5.2
1447	SMAW	E6011	100	None	0	0.005	0.001	0.998	0.005	38.4
1447	SMAW	E6010	100	None	0	0.003	---	0.991	0.004	25.6
1447	SMAW	E7018	50	None	0	0.006	0.001	1.03	0.002	18.4
1890	SMAW	E6010	10	None	0	0.003	---	0.991	0.004	25.6
1890	SMAW	E7018	10	HEPA Filter	99	0.006	0.001	1.03	0.002	18.4
1890	GMAW	ER70S	100	HEPA Filter	99	0.001	0.001	0.318	0.001	5.2

(a) HAP Emission factors for SMAW & GMAW welding taken from AEI Guidance Document, "Table 33-2, Hazardous Air Pollutant Emission Factors for Welding Operations"
Particulate emission factors for SMAW & GMAW welding taken from AEI Guidance Document, "Table 33-1, PM-10 Emission Factors for Welding Operations"
(b) Since MIG welding is the same as GMAW, emission factors for the electrode E70S were applied since this type of wire is used elsewhere at the facility.

Building Location	Electrode Type	Actual E_{hap}				Potential E_{hap}[c]				Actual E_{PM-10}	Potential E_{PM-10}[b]
		Cr	Co	Mn	Ni	Cr	Co	Mn	Ni		
471	Coiled Wire	1.20E-04	1.20E-04	3.82E-02	1.20E-04	5.04E-04	5.04E-04	1.60E-01	5.04E-04	0.62	2.62
471	6010	6.00E-04	NA	1.98E-01	8.00E-04	2.52E-03	NA	8.32E-01	3.36E-03	5.12	21.50
471	6011	1.00E-03	2.00E-04	2.00E-01	1.00E-03	4.20E-03	8.40E-04	8.38E-01	4.20E-03	7.68	32.26
471	7018	1.20E-03	2.00E-04	2.06E-01	4.00E-04	5.04E-03	8.40E-04	8.65E-01	1.68E-03	3.68	15.46
471	6010	1.20E-03	NA	3.96E-01	1.60E-03	5.04E-03	NA	1.66E+00	6.72E-03	10.24	43.01
471	6011	2.00E-03	4.00E-04	3.99E-01	2.00E-03	8.40E-03	1.68E-03	1.68E+00	8.40E-03	15.36	64.51
471	7018	2.40E-03	4.00E-04	4.12E-01	8.00E-04	1.01E-02	1.68E-03	1.73E+00	3.36E-03	7.36	30.91
1447	Coiled Wire	6.60E-05	6.60E-05	2.10E-02	6.60E-05	2.77E-04	2.77E-04	8.81E-02	2.77E-04	0.34	1.44
1447	E6011	5.00E-04	1.00E-04	9.98E-02	5.00E-04	2.10E-03	4.20E-04	4.19E-01	2.10E-03	3.84	16.13
1447	E6010	3.00E-04	NA	9.91E-02	4.00E-04	1.26E-03	NA	4.16E-01	1.68E-03	2.56	10.75
1447	E7018	3.00E-04	5.00E-05	5.15E-02	1.00E-04	1.26E-03	2.10E-04	2.16E-01	4.20E-04	0.92	3.86
1890	E6010	3.00E-05	NA	9.91E-03	4.00E-05	1.26E-04	NA	4.16E-02	1.68E-04	0.26	1.08
1890	E7018	6.00E-07	1.00E-07	1.03E-04	2.00E-07	2.52E-06	4.20E-07	4.33E-04	8.40E-07	0.00	0.01
1890	ER70S	1.00E-06	1.00E-06	3.18E-04	1.00E-06	4.20E-06	4.20E-06	1.34E-03	4.20E-06	0.01	0.02
	Total (pounds/yr)	**9.72E-03**	**1.54E-03**	**2.13E+00**	**7.83E-03**	**4.08E-02**	**6.46E-03**	**8.95E+00**	**3.29E-02**	**57.99**	**243.56**
	Total (tons/yr)	**4.86E-06**	**7.69E-07**	**1.07E-03**	**3.91E-06**	**2.04E-05**	**3.23E-06**	**4.48E-03**	**1.64E-05**	**0.03**	**0.12**

(c) Potential emissions are scaled-up by a ratio of 4.2 from correlating current base operating hours of 2080 annually to 8760 hours per year.

SECTION 30

WET COOLING TOWERS

Source Description

Wet cooling towers at MAFB are devices that are used to remove heat from the refrigerant in heating, ventilation, and air conditioning systems. There is one wet cooling tower operating at MAFB. Wet cooling towers at Air Force Bases are included in the two-digit SIC Code 97 for National Security and International Affairs. The applicable SCC Code for the induced draft wet cooling tower at MAFB is 3-85-001-01.

Actual Emissions

Actual emissions from wet cooling towers were calculated using the rated gallons per minute of cooling water circulating through the cooling tower, the operating hours per year, a drift factor (water droplets escaping the tower into the atmosphere), and the total dissolved solids (TDS) content of the water. The data for these calculations was obtained from MAFB personnel and AP-42 Section 13.4 (TDS and drift factor also included in AEI Guidance Document).

The cooling tower operates from May to December or 245 days per year. PM emissions were assumed to be equal to PM_{10} emissions. The total estimated PM emissions for 1999 were estimated to be 0.09 lb/yr as shown in the attached calculation.

Potential Emissions

Potential emissions from wet cooling towers were based on the maximum amount of time the cooling water is circulated in the tower. Since the cooling water circulates continuously while the cooling tower is operating, potential and actual emissions from the wet cooling towers were assumed to be equivalent.

References

1. U.S. Air Force Bioenvironmental Engineering Division, Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations, Brooks Air Force Base, TX 78235-5114, May 1999.

2. U.S. Environmental Protection Agency, Compilation of Air Pollutant Emission Factors - Volume I: Stationary Point and Area Sources (AP-42), Section 13.4, January 1995.

Client:	Malmstrom AFB	**Date:**	8/24/00
Location:	Malmstrom AFB	**Emissions:**	Actual and Potential
Subject:	Cooling Tower	**Calc by:**	*SBH*

E_{PM} = WFR * D * 0.001 * LDF * TDS/10^6

	Value	**Basis**
E_{PM} = Emissions of particulate matter (lb/yr)		
WFR = Circulating Water Flow Rate (gal/day)	250	AFB data
D = Number of days coooling tower was in operation during the year (day/yr)	245	May-December
0.001 = factor for converting "gallons" to 10^3 gallons"	-	
LDF = Total liquid drift factor (lb/10^3 gal)	1.7	Table 34-1 of AEI Guidance for Induced
TDS = Concentration of Total Dissolved Solids in the circulating water (ppm)	900	AFB data
10^6 = Factor for converting "ppm" into "weight fraction"		

E_{PM} = **0.094 lb/yr**

Emissions of PM10 is assume equal to PM based on the AIE Guidance Document

PM10 emissions = **0.094 lb/yr**

SECTION 31

WOOD CHIPPER AND STORAGE

Source Description

Woodchipping is performed by a contractor at MAFB. A portable wood chipper is brought onsite for one to two days each quarter. Wood waste is chipped and stored in a pile. Woodworking activities at Air Force Bases are included in the two-digit standard industrial classification code (SIC) 97 for National Security and International Affairs. There are no applicable SCC codes for woodworking or chipping.

Actual Emissions

Actual emissions from the chipper were estimated using an AP42 emission factor of 2 lbs of particulate per hour. PM10 emissions were assumed to equal total particulate emissions from chipping. Total particulate and PM10 emissions from the storage pile (including wind erosion, loading in, loading out, and vehicular activity) were estimated using AP42 equations for storage piles. Total actual particulate emissions from the chipper and piles are 1.25 tpy. Total PM_{10} emissions are 0.58 tpy.

Potential Emissions

Potential emissions are estimated by multiplying the actual emissions by the sitewide scaleup factor of 4.2. This is arrived at by dividing the plantwide hours (2,080) into 8,760 hours. Potential emissions from woodchipping are 5.7 tpy for total particulate and 2.4 tpy for PM_{10}.

References

1 U.S. Air Force Bioenvironmental Engineering Division, Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations, Brooks Air Force Base, TX 78235-5114, May 1999.

Client: Malmstrom AFB
Location:
Subject: Wood Chipper and Storage Pile

Date: 10/4/2000
Emissions Actual and Potential
Calc by: *SBH*

DESCRIPTION: A portable chipper is brought onsite once a quarter and chips wood for 1-2 days, or 15 tons per quarter. Chips are stored is a pile. Emissions occur from the chipper and handling and storage of the chips.

EMISSIONS FROM CHIPPING:

Emission related information and data:

Parameter	Value	Basis
Quantity of chips collected per year in 1999 (tons)	15	MAFB
Quantity of chips collected per quarter (tons)	60	tons per quarter x 4
Particulate emission factor for wood chipping (lbs/hr)	2	AP-42, Section 10.4, Table 10.4-1(1980), Particulate Emission Factors for Large Diameter Cyclones in Woodworking Waste Collection Systems. Factor for "Other" operations which includes secondary waste cyclones
Uncontrolled fugitive emission factor for plywood veneer and layout operations: sawdust handling	1 lb particulate per ton of sawdust handled (equivalent to 0.05% becoming airborne)	AP-42, Section 10.3, Table 10.3-1, 2/80
Operating hours per day for chipper	8	One Shift
Operating days per year for chipper	8	2 days each quarter

Emissions from Chipping:

Particulate emitted (ton/yr) = Particulate emitted (lb/hr) x Operating hours per day x days per year x maximum days per year/2000 lb/ton=

Particulate Actual Emissions, ton/yr = 2 lbs/hr X 8 days/yr x 8 hrs/day / 2000 lb/ton = 0.064 tpy

PM10 emissions = PM emissions = 0.064 tpy

EMISSIONS FROM STORAGE AND HANDLING:

From Wood Chip Storage Pile Worksheet:
PM Emissions (tpy) = 1.29
PM10 Emissions (tpy) = 0.52

Total Actual Emissions
TSP emissions from Woodchipping and storage (tpy) = **1.35**
PM10 emissions from Woodchipping and storage (tpy)= **0.58**

Potential Emissions
Potential emissions = 4.2 x actual emissions (8760 potential hours / 2080 basewide hours)
Potential TSP emissions from Woodchipping and storage (tpy) = **5.69**
Potential PM10 emissions from Woodchipping and storage (tpy)= **2.44**

Client:	Malmstrom AFB	**Date:**	8/24/00
Location:		**Emissions:**	Actual and Potential
Subject:	Wood Chip Storage Pile	**Calc by:**	*SBH*

Calculation Approach:

Material Load-In emissions = Material load-in EF (lb/ton) x tons material throughput
Wind Erosion emissions = wind erosion EF (lb/ton) x tons material stored
Vehicular Activity emissions = Vehicular Activity EF (lb/ton) x tons material throughput
Material Load-Out emissions = Material load-out EF (lb/ton) x tons material throughput

Wood Chip silt content wt. % (s)	7	Data from knowledge of a similar source at another facility
Wood Chip moisture content st. % (M)	40	Data from knowledge of a similar source at another facility
Mean wind speed, mph (U)	12.3	Nat. Weather Service Office,
Duration of chips in storage, days (D)	90	Assumed based on wood being chipped once per quarter
Number of dry days/year (d)	264	Nat. Weather Service Office,
Percent of time wind speed exceeds 12 mph (f)	50	Climatic Atlas of the US
Activity correction for wood chips (K)	0.08	OEPA RACM Table 2.1.2-5 (assumed)
Loader capacity, cubic yards (Y)	3	Engineering assumption
Amount of chips handled in 1999, tons	400	Plant Data - 15 tons per quarter
Amount of chips stored, tons	2000	Assumes pile size of 132,000 ft3 and density of 30 lb/ft3
Particle size multiplier for TSP (load-in/load-out)	0.74	AP-42, Section 13.2.2
Particle size multiplier for PM-10 (load-in/load-out)	0.35	AP-42, Section 13.2.2
PM-10 component for wind and vehicular activity	40%	OEPA RACM, Section 2.1.2

Emission Factor (EF) Calculation - OEPA RACM Table 2.1.2-5 (lb/ton)

Load-in: EF = 0.0018(s/5)(U/5)/(M/2)/(Y/6)	0.0006
Wind erosion: EF = 0.025(s/1.5)(D/90)(d/235)(f/15)	1.2815
Vehicular activity: EF = 0.10K(s/1.5)(d/235)	0.0419
Load-out: EF = 0.0018(s/5)(U/5)/(M/2)/(Y/6)	0.0006

Material	Activity	Uncontrolled TSP Emission Factor lb/ton	Uncontrolled PM-10 Emission Factor lb/ton	Material Throughput/ Stored, tpy	Uncontrolled TSP Emissions tpy	Control Method	Control Efficiency %	Controlled Emissions, TSP tpy	Controlled Emissions, PM-10 tpy
Wood Chips	Material Load-In	0.0005	0.0002	400	0.0001	None	0	0.0001	0.0000
Wood Chips	Wind Erosion	1.2815	0.5126	2,000	1.2815	None	0	1.2815	0.5126
Wood Chips	Vehicular Activity	0.0419	0.0168	400	0.0084	None	0	0.0084	0.0034
Wood Chips	Material Load-Out	0.0005	0.0002	400	0.0001	None	0	0.0001	0.0000
	Total							**1.29**	**0.52**

SECTION 32

WOODWORKING

Source Description

Woodworking is performed at the Vertical Wood Shop in Building 471, TMO in Building 800, Consolidated Skills Center in Building 1248, and the Woodshop in Building 1447. Woodworking activities at Air Force Bases are included in the two-digit standard industrial classification code (SIC) 97 for National Security and International Affairs. There are no applicable SCC codes for woodworking.

Actual Emissions

Actual emissions (PM) from woodworking were calculated by using the captured particulate and control efficiency to estimate the uncontrolled emissions, then subtracting the captured particulate from the uncontrolled PM. The measurements of the dust bins collecting the controlled PM were provided by MAFB personnel as well as through direct measurement of the bins. Captured dust quantities were estimated using the bin volumes along with the frequency of emptying the bins and the portion of the bin that was filled when it was emptied. The estimated control efficiency was assumed to be 99% for a fabric filter and 90% for a cyclone. The average density of the saw dust was assumed to be 11.5 lb/ft^3 based on the AEI Guidance Document.

The cyclone at the Vertical Wood Shop has a six cubic yard collection bin that is emptied quarterly. The TMO, Consolidated Skills Center and Woodshop operations each empty into a 55-gallon drum. Both TMO and the Consolidated Skills Center have particulate filters present while the Woodshop employ a cyclone to control particulate emissions. TMO's drum is emptied three times per year, Consolidated Skills Center's drum is emptied weekly, and the Woodshop's drum is emptied approximately 100 times annually. Total PM emissions from woodworking are estimated to be 1,814 pounds per year.

Potential Emissions

Potential emissions from woodworking are scaled up by a ratio of 4.2 from correlating current base operating hours of 2,080 annually to 8,760 hours/yr. Total potential PM emissions from woodworking is therefore 7,619 lb/yr or 3.81 tons per year.

References

1. U.S. Air Force Bioenvironmental Engineering Division, Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations , Brooks Air Force Base, TX 78235-5114, May 1999.

2. Radian Corporation, 1994 Air Pollutant Emissions Inventory for Holloman Air Force Base, New Mexico, 13 November 1995.

Client:	Malmstrom AFB	**Date:**	8/24/00
Location:	Buildings 471, 800, 1248, 1447	**Emissions:**	Actual and Potential
Subject:	Woodworking	**Calc by:**	*SSR*

There are four locations where woodworking occurs: Bldg 471, Vertical Wood Shop; Bldg 800, TMO; Bldg 1248, Consolidated Skills Center; and Bldg 1447, Woodshop.

Calculating the PM emissions from woodworking operations is based on the efficiency of the control device and the amount of sawdust collected/captured.

Calculate total amount of waste material exhausted to control device:

SDtotal = SDcol / (eff / 100)

Where,
1. Total amount of sawdust generated by equipment (lb/yr)= SDtotal
2. Amount of saw dust captured by the control (lb/yr)= SDcol
3. Efficiency of PM control (%) = eff

The amount of saw dust captured by the control device is estimated using the volume of the dust bin for the control device, the number of times per year the dust is emptied during the year, and how full the dust bin is when it is emptied. The average density of saw dust presented in the AEI guidance is 11.5 lb/cu.ft.

Saw Dust Collected = Volume Dust Bins (ft^3) x Emptying Frequency x Sawdust Density (lb/ft^3)

Building Location	Shop	Dust Bin % Full	Volume of Dust Bin(s), cu.ft.	Frequency of Emptying, times/yr	Sawdust Density, lb/cu.ft.	SDcol, lbs/yr
471	Vertical Wood Shop	100	162.0	4	11.50	**7,452**
800	TMO	100	7.35	3	11.50	**254**
1248	Consolidated Skills Center	100	7.35	52	11.50	**4,395**
1447	Woodshop	100	7.35	100	11.50	**8,453**

Calculate the PM emission rate (Epm) by subtracting the amount of saw dust collected from the total amount of saw dust entering the control device:

PM Emissions

Emission PM (Epm) = SDtotal (lb/yr) - SDcol (lb/yr)

Building Location	Type	Control device	Control Efficiency (eff) %	SDcol, lbs/yr	SDtotal, lb/yr	Epm (lbs/yr)
471	Vertical Wood Shop	Cyclone	90	7,452	8,280	**828**
800	TMO	Filters	99	254	256	**3**
1248	Consolidated Skills Center	Filters/Cyclone	99	4,395	4,440	**44**
1447	Woodshop	Cyclone	90	8,453	9,392	**939**
					Total (lb/yr):	**1,814**
					Total (ton/yr):	**0.91**

Note: PM10 assumed to be equal to PM emissions
Potential emissions from woodworking are scaled up by a ratio of 4.2 from correlating current operating hours of 2080 hrs/yr to 8760 hrs/yr. Potential emissions from woodworking are:

Woodworking Potential PM emissions = Potential to 1999 ratio (4.2) x 1999 emissions

Woodworking Potential PM emissions = 4.2 x 1,814 lb/yr PM = 7619 lb/yr
= 3.81 ton/yr

SECTION 33

X-RAY PROCESSING

Source Description

X-ray processing is performed in the Dental and Medical Clinics (Building 2040). It is included in the two-digit SIC 97 for National Security and International Affairs. The SCC that best describes this emission category is petroleum and solvent evaporation, fugitive emissions 4-01-888-98.

Actual Emissions

Actual emissions were estimated using a mass balance approach. TSgt Olson in the Medical Clinic, and TSgt Giorgio in the Dental Clinic, provided the material usages. Material Safety Data Sheets (MSDS) were obtained from Eastman Kodak and Air Techniques, Inc. for the respective product. Where appropriate, the working solution chemical composition for the material was used.

The developer/replenisher contains hydroquinone. Hydroquinone has a boiling point of 285°C. The X-ray processing does not approach this temperature. Therefore, emissions of hydroquinone are estimated to be zero.

Actual emissions from x-ray processing are based on the mass balance approach, described in the AEI Guidance Document, Section 20, Miscellaneous Chemical Use. Primary pollutants of concern are VOC and HAP. Actual emissions of VOC and HAP were estimated at 110.88 lb/yr (0.06 tpy) and 0, respectively.

Potential Emissions

Potential emissions from x-ray processing would correlate with the potential increase in MAFB operating hours. The ratio of the potential operating hours (8,760) to actual operating hours in 1999 (2,080) is 4.21. Actual VOC and HAP emissions were multiplied by this ratio to calculate potential emissions. Potential VOC and HAP emissions are 466.99 lb/yr (0.23 tpy), and 0 lb/yr, respectively.

References

1. U.S. Air Force Bioenvironmental Engineering Division, Air Emissions Inventory Guidance Document for Stationary Sources at Air Force Installations, Brooks Air Force Base, TX 78235-5114, May 1999.

2. Material Safety Data Sheets for the Various Chemicals

3. TSgt Olson, Base Medical Clinic (Building 2040) and TSgt Giorgio, Base Dental Clinic (Building 2040)

Client: Malmstrom AFB
Location: Medical and Dental Clinic X-Ray (Building 2040)
Subject: Emissions from X-Ray Processing

Date: 08/29/2000
Emissions: Actual and Potential
Calc by: *TLW/NM*

Basis:

Emissions from x-ray processing are based on the mass balance as described in the AEI Guidance Document, Section 20 Miscellaneous Chemical Use. The primary pollutants of concern are VOC and organic HAP's. The following table summarizes the material usage information provided by TSgt. Olson anTSgt. Giorgio of the Base Medical and Dental Clinics, respectively (Building 2040). Material compositions were taken from MSDS sheets supplied by Eastman Kodak and Air Techniques, Inc., included in Appendix B. Where applicable, product composition for the working solution was assumed.

Calculations were completed based on the following equations:

Emissions VOC - Actual (lbs/yr) = 1999 Material Usage (lb) x Specific Gravity x 8.35 lb/gal x Weight % VOC /100

Emissions VOC - Potential (lb/yr) = Emissions VOC - Actual (lb/yr) * 8,760 potential hours / 2,080 actual hours 1999

Volatile Organic Compound (VOC) and Hazardous Air Pollutant (HAP) Emissions from X-Ray Processing

Component	NSN	1999 Usage		Specific Gravity	1999 lb	%VOC	%HAP	HAP Constituents [1]	Emissions VOC-Actual lb/yr	Emissions VOC-Pot. lb/yr	Emissions HAP-Actual lb/yr	Emissions HAP-Pot. lb/yr
Dental Clinic												
Kodak Readymatic Dental Developer and Replenisher	6525011680528	60	gal	1.08	541.08	5.00	2	hydroquinone	27.05	113.94	0.00	0.00
Kodak Readymatic Dental Fixer and Replenisher	6525011680528	60	gal	1.10	551.10	5.00	0	none	27.56	116.05	0.00	0.00
Formula 2000	6850012565029	8	liter	1.05	18.46	0.00	0	none	0.00	0.00	0.00	0.00
[redacted]		8	packs	Unknown	Unknown	0.00	0	none	0.00	0.00	0.00	0.00
Spray 2000	6520L833404R	2	liter	1	4.39	0.00	0	none	0.00	0.00	0.00	0.00
Medical Clinic									0.00	0.00	0.00	0.00
Kodak RP X-Omat LO Fixer and Replenisher	6525010985799	620	gal	1.087	5,627.40	1.00	0	none	56.27	237.00	0.00	0.00
Kodak RP X-Omat Developer Replenisher	6525011991984	550	gal	1.082	4,969.09	0.00	3	hydroquinone	0.00	0.00	0.00	0.00
Kodak RP X-Omat Developer Starter	6525001352281	195	gal	1.106	1,800.84	0.00	0	none	0.00	0.00	0.00	0.00
								Total, lb/yr	110.88	466.99	0.00	0.00
								Total, tn/yr	0.06	0.23	0.00	0.00

1) Hydroquinone boiling point is 286 degrees C. The operation does not approach this level; therefore negligible amounts of hydroquinone are emitted.

APPENDIX A

POLLUTANT TARGET LIST

REGULATED POLLUTANTS

CAS No.	Pollutant Name	REGULATING PROGRAM				
		Criteria, (a)	NSPS	HAP, (b)	Accidental, (c)	ODS, (d)
75-07-0	Acetaldehyde			✓	F (10,000)	
60-35-5	Acetamide			✓		
64-19-7	Acetic acid					
67-64-1	Acetone					
75-05-8	Acetonitrile			✓		
98-86-2	Acetophenone			✓		
53-96-3	2-Acetylaminofluorene			✓		
74-86-2	Acetylene				F (10,000)	
107-02-8	Acrolein			✓	T (5,000)	
79-06-1	Acrylamide			✓		
79-10-7	Acrylic acid			✓		
107-13-1	Acrylonitrile			✓	T (20,000)	
814-68-6	Acrylyl chloride				T (5,000)	
1071-88-6	Allyl alcohol				T (15,000)	
107-05-1	Allyl chloride			✓		
107-11-9	Allylamine				T (10,000)	
7429-90-5	Aluminum (fume or dust)					
1344-28-1	Aluminum oxide					
92-67-1	4-Aminobiphenyl			NR		
7664-41-7	Ammonia (anhydrous)			NR	T (10,000)	
766-41-7	Ammonia (conc. 20% or greater)				T (20,000)	
1336-21-6	Ammonium hydroxide					
6484-52-2	Ammonium nitrate					
62-53-3	Aniline			✓		
90-04-0	o-Anisidine			✓		
104-94-9	p-Anisidine					
7440-36-0	Antimony and compounds			NR		
120-12-7	Anthracene					
7440-38-2	Arsenic compounds (inorganic, including arsine)			✓		
7784-34-1	Arsenous trichloride				T (15,000)	
7784-42-1	Arsine				T (1,000)	
1332-21-4	Asbestos			✓		
7440-39-3	Barium and compounds					
71-43-2	Benzene			✓		
92-87-5	Benzidine			✓		
98-07-7	Benzotrichloride			✓		
100-44-7	Benzyl chloride			✓		
7440-41-7	Beryllium compounds			✓		
92-52-4	Biphenyl			✓		
117-81-7	Bis(2-ethylhexyl)phthalate (DEHP)			NR		
542-88-1	Bis(chloromethyl)ether			✓		
10294-34-5	Boron trichloride				T (5,000)	
7637-07-2	Boron trifluoride				T (5,000)	
353-42-4	Boron trifluoride compound w/ methyl ether (1:1)				T (15,000)	
7726-95-6	Bromine				T (10,000)	
75-25-2	Bromoform			✓		
74-83-9	Bromomethane (Methyl bromide)			✓		
596-73-2	Bromotrifluorethylene				F (10,000)	
75-63-8	Bromotrifluoromethane (Halon 1301)					I
106-99-0	1,3-Butadiene			✓	F (10,000)	
106-97-8	Butane				F (10,000)	
106-98-9	1-Butene				F (10,000)	
107-01-7	2-Butene				F (10,000)	
590-18-1	2-Butene(cis)				F (10,000)	
624-64-6	2-Butene(trans)				F (10,000)	
25167-67-3	Butene				F (10,000)	
111-76-2	2-Butoxy ethanol					
141-32-2	Butyl acrylate					
71-36-3	n-Butyl alcohol					
123-72-8	Butyraldehyde					
156-62-7	Calcium cyanamide					
105-60-2	Caprolactam			✓		

REGULATED POLLUTANTS

CAS No.	Pollutant Name	REGULATING PROGRAM				
		Criteria, (a)	NSPS	HAP, (b)	Accidental, (c)	ODS, (d)
133-06-2	Captan			NR		
63-25-2	Carbaryl			NR		
75-15-0	Carbon disulfide			✓	T (20,000)	
630-08-0	Carbon monoxide	✓	✓			
463-58-1	Carbon oxysulfide				F (10,000)	
56-23-5	Carbon tetrachloride			✓		I
463-58-1	Carbonyl sulfide			NR		
120-80-9	Catechol			NR		
133-90-4	Chloramben			NR		
57-74-9	Chlordane			NR		
7782-50-5	Chlorine			NR	T (2,500)	
10049-04-4	Chlorine dioxide				T (1,000)	
7791-21-1	Chlorine monoxide				F (10,000)	
79-11-8	Chloroacetic acid			✓		
532-27-4	2-Chloroacetophenone			✓		
108-90-7	Chlorobenzene			✓		
510-15-6	Chlorobenzilate			NR		
75-69-4	Chlorofluorocarbon-11 (CFC-11)	E				I
954-56-3	Chlorofluorocarbon-111 (CFC-111)					I
76-12-0	Chlorofluorocarbon-112 (CFC-112)					I
76-13-1	Chlorofluorocarbon-113 (CFC-113)	E				I
76-14-2	Chlorofluorocarbon-114 (CFC-114)	E				I
76-15-3	Chlorofluorocarbon-115 (CFC-115)	E				I
75-71-8	Chlorofluorocarbon-12 (CFC-12)	E				I
75-72-9	Chlorofluorocarbon-13 (CFC-13)					I
422-78-6	Chlorofluorocarbon-211 (CFC-211)					I
3182-26-1	Chlorofluorocarbon-212 (CFC-212)					I
2354-06-5	Chlorofluorocarbon-213 (CFC-213)					I
29255-31-0	Chlorofluorocarbon-214 (CFC-214)					I
4259-43-2	Chlorofluorocarbon-215 (CFC-215)					I
661-97-2	Chlorofluorocarbon-216 (CFC-216)					I
422-86-6	Chlorofluorocarbon-217 (CFC-217)					I
67-66-3	Chloroform			✓	T (20,000)	
542-88-1	Chloromethyl ether				T (1,000)	
107-30-2	Chloromethyl methyl ether			NR	T (5,000)	
126-99-8	Chloroprene			✓		
590-21-6	1-Chloropropylene				F (10,000)	
557-98-2	2-Chloropropylene				F (10,000)	
7440-47-3	Chromium and compounds			✓		
65996-93-2	Coal tar pitch volatiles					
7440-48-4	Cobalt and compounds			NR		
	Coke Oven Emissions			✓		
7440-50-8	Copper and compounds					
108-39-4	m-Cresol			✓		
95-48-7	o-Cresol			✓		
106-44-5	p-Cresol			✓		
1319-77-3	Cresols/cresylic acid (isomers and mixture)			✓		
4170-30-3	Crotonaldehyde				T (20,000)	
123-73-9	Crotonaldehyde,(E)-				T (20,000)	
98-82-8	Cumene			✓		
	Cyanide Compounds			NR		
460-19-5	Cyanogen				F (10,000)	
506-77-4	Cyanogen chloride				T (10,000)	
110-82-7	Cyclohexane					
108-91-8	Cyclohexylamine				T (15,000)	
75-19-4	Cyclopropane				F (10,000)	
94-75-7	2,4-D, salts and esters			NR		
72-55-9	1,1-dichloro-2,2-bis (p-chlorophenyl) ethylene			NR		
1163-19-5	Decabromodiphenyl oxide					
334-88-3	Diazomethane			NR		
132-64-9	Dibenzofuran		✓	NR		
19287-45-7	Diborane				T (2,500)	

REGULATED POLLUTANTS

CAS No.	Pollutant Name	REGULATING PROGRAM				
		Criteria, (a)	NSPS	HAP, (b)	Accidental, (c)	ODS, (d)
96-12-8	1,2-Dibromo-3-chloropropane			✓		
84-74-2	Dibutylphthalate			NR		
106-46-7	1,4-Dichlorobenzene			✓		
91-94-1	3,3-Dichlorobenzidine			✓		
111-44-4	Dichloroethyl ether			✓		
75-09-2	Dichloromethane (Methylene chloride)			✓		
78-87-5	1,2-Dichloropropane (Propylene dichloride)			✓		
542-75-6	1,3-Dichloropropene			✓		
4109-96-0	Dichlorosilane				F (10,000)	
62-73-7	Dichlorvos			NR		
111-42-2	Diethanolamine			✓		
60-29-7	Diethyl ether					
84-66-2	Diethyl phthalate					
64-67-5	Diethyl sulfate			NR		
75-37-6	Difluoroethane				F (10,000)	
127-19-5	Dimethyl acetamide					
60-11-7	Dimethyl aminoazobenzene			NR		
121-69-7	N,N-Dimethylaniline			✓		
119-93-7	3,3-Dimethylbenzidine			✓		
119-90-4	3,3-Dimethoxybenzidine			NR		
79-44-7	Dimethylcarbamoyl chloride			NR		
68-12-2	N,N-Dimethylformamide			✓		
57-14-7	1,1-Dimethylhydrazine			✓	T (15,000)	
131-11-3	Dimethyl phthalate			✓		
77-78-1	Dimethyl sulfate			✓		
124-40-3	Dimethylamine				F (10,000)	
75-78-5	Dimethyldichlorosilane				T (5,000)	
463-82-1	2,2-Dimethylpropane				F (10,000)	
534-52-1	4,6-Dinitro-o-cresol, and salts			NR		
51-28-5	2,4-Dinitrophenol			✓		
121-14-2	2,4-Dinitrotoluene			✓		
123-91-1	1,4-Dioxane (1,4-Diethyleneoxide)			✓		
122-66-7	1,2-Diphenylhydrazine			✓		
	Dioxin/furan (total tetra through octa chlorinated dibenzo-p-dioxins and dibenzofuran)		✓			
106-89-8	Epichlorohydrin (1-Chloro-2,3-epoxypropane)			✓	T (20,000)	
106-88-7	1,2-Epoxybutane			✓		
74-84-0	Ethane	E			F (10,000)	
64-17-5	Ethanol					
107-00-6	Ethyl acetylene				F (10,000)	
140-88-5	Ethyl acrylate			✓		
51-79-6	Ethyl carbamate (Urethane)			NR		I
75-00-3	Ethyl chloride (Chloroethane)			✓	F (10,000)	
60-29-7	Ethyl ether				F (10,000)	
75-08-1	Ethyl mercaptan				F (10,000)	
109-95-5	Ethyl nitrite				F (10,000)	
75-04-7	Ethylamine				F (10,000)	
100-41-4	Ethylbenzene			✓		
74-85-1	Ethylene				F (10,000)	
151-56-4	Ethyleneimine (Aziridine)			NR	T (10,000)	
107-07-3	Ethylene chlorohydrin/2-Chloroethanol					
106-93-4	Ethylene dibromide (Dibromoethane)			✓		
107-06-2	Ethylene dichloride (1,2-Dichloroethane)			✓		
107-21-1	Ethylene glycol			✓		
103-23-1	Bis(2-ethylhexyl)adipate					
75-21-8	Ethylene oxide			✓	T (10,000)	
96-45-7	Ethylene thiourea			NR		
107-15-3	Ethylenediamine				T (20,000)	
151-56-4	Ethyleneimine				T (10,000)	
75-34-3	Ethylidene chloride (1,1-Dichloroethane)			✓		
	Fine mineral fibers			NR		
	Fluorides		✓			

REGULATED POLLUTANTS

CAS No.	Pollutant Name	REGULATING PROGRAM				
		Criteria, (a)	NSPS	HAP, (b)	Accidental, (c)	ODS, (d)
7782-41-4	Fluorine				T (1,000)	
50-00-0	Formaldehyde			✓		
50-00-0	Formaldehyde (Solution)				T (15,000)	
110-00-9	Furan				T (5,000)	
98-01-1	Furfural					
	Glycol ethers			✓		
421-01-2	Halon-1211					I
75-63-8	Halon-1301					I
124-73-2	Halon-2402					I
76-44-8	Heptachlor			NR		
118-74-1	Hexachlorobenzene			✓		
87-68-3	Hexachlorobutadiene			✓		
77-47-4	Hexachlorocyclopentadiene			NR		
67-72-1	Hexachloroethane			✓		
822-06-0	Hexamethylene-1,6-diisocynate			NR		
680-31-9	Hexamethylphosphoramide			NR		
100-54-3	Hexane			✓		
302-01-2	Hydrazine			NR	T (15,000)	
7647-01-0	Hydrochloric acid		✓	NR	T (15,000)	
75-43-4	Hydrochlorofluorocarbon-21 (HCFC-21)					II
75-45-6	Hydrochlorofluorocarbon-22 (HCFC-22)					II
593-70-4	Hydrochlorofluorocarbon-31 (HCFC-31)					II
134237-32-4	Hydrochlorofluorocarbon-121 (HCFC-121)					II
354-21-2	Hydrochlorofluorocarbon-122 (HCFC-122)					II
306-83-2	Hydrochlorofluorocarbon-123 (HCFC-123)	E				II
2837-89-0	Hydrochlorofluorocarbon-124 (HCFC-124)	E				II
134237-34-6	Hydrochlorofluorocarbon-131 (HCFC-131)					II
33579-37-2	Hydrochlorofluorocarbon-132 (HCFC-132)					II
431-07-2	Hydrochlorofluorocarbon-133 (HCFC-133)					II
2516-78-8	Hydrochlorofluorocarbon-141 (HCFC-141)					II
338-65-8	Hydrochlorofluorocarbon-142 (HCFC-142)					II
134237-35-7	Hydrochlorofluorocarbon-221 (HCFC-221)					II
134237-36-8	Hydrochlorofluorocarbon-222 (HCFC-222)					II
134237-37-9	Hydrochlorofluorocarbon-223 (HCFC-223)					II
134237-38-0	Hydrochlorofluorocarbon-224 (HCFC-224)					II
127564-92-5	Hydrochlorofluorocarbon-225 (HCFC-225)					II
134308-72-8	Hydrochlorofluorocarbon-226 (HCFC-226)					II
134190-48-0	Hydrochlorofluorocarbon-231 (HCFC-231)					II
134237-39-1	Hydrochlorofluorocarbon-232 (HCFC-232)					II
134237-40-4	Hydrochlorofluorocarbon-233 (HCFC-233)					II
127564-83-4	Hydrochlorofluorocarbon-234 (HCFC-234)					II
134237-83-5	Hydrochlorofluorocarbon-235 (HCFC-235)					II
134190-49-1	Hydrochlorofluorocarbon-241 (HCFC-241)					II
134237-42-6	Hydrochlorofluorocarbon-242 (HCFC-242)					II
134237-43-7	Hydrochlorofluorocarbon-243 (HCFC-243)					II
134190-50-4	Hydrochlorofluorocarbon-244 (HCFC-244)					II
134190-51-5	Hydrochlorofluorocarbon-251 (HCFC-251)					II
134190-52-6	Hydrochlorofluorocarbon-252 (HCFC-252)					II
134237-44-8	Hydrochlorofluorocarbon-253 (HCFC-253)					II
134237-45-9	Hydrochlorofluorocarbon-261 (HCFC-261)					II
134190-53-7	Hydrochlorofluorocarbon-262 (HCFC-262)					II
134190-54-8	Hydrochlorofluorocarbon-271 (HCFC-271)					II
74-90-8	Hydrocyanic acid				T (2,500)	
1333-74-0	Hydrogen				F (10,000)	
7647-01-0	Hydrogen chloride (Hydrochloric acid)		✓	NR	T (5,000)	
7647-01-0	Hydrogen chloride (Anhydrous)			NR	T (5,000)	
7664-39-3	Hydrogen fluoride (Hydrofluoric acid)			✓		
7664-39-3	Hydrogen fluoride (conc. 50% or greater)			✓	T (1,000)	
7783-07-5	Hydrogen selenide				T (500)	
7783-06-4	Hydrogen sulfide		✓	NR	T (10,000)	
123-31-9	Hydroquinone			✓		
13463-40-6	Iron, Pentacarbonyl-				T (2,500)	

REGULATED POLLUTANTS

CAS No.	Pollutant Name	REGULATING PROGRAM				
		Criteria, (a)	NSPS	HAP, (b)	Accidental, (c)	ODS, (d)
75-28-5	Isobutane				F (10,000)	
78-84-2	Isobutyraldehyde					
78-82-0	Isobutyronitrile				T (20,000)	
78-78-4	Isopentane				F (10,000)	
78-59-1	Isophorone			✓		
78-79-5	Isoprene				F (10,000)	
67-63-0	Isopropyl alcohol					
75-29-6	Isopropyl chloride				F (10,000)	
108-23-6	Isopropyl chloroformate				T (15,000)	
75-31-0	Isopropylamine				F (10,000)	
	Lead and compounds	✓	✓	NR		
58-89-9	1,2,3,4,5,6-Hexachlorocyclohexane (all stereo isomers, including Lindane)			NR		
108-31-6	Maleic anhydride			✓		
7439-96-5	Manganese and compounds			NR		
7439-97-6	Mercury and compounds			✓		
126-98-7	Methacrylonitrile				T (10,000)	
74-82-8	Methane	E			F (10,000)	
67-56-1	Methanol			✓		
72-43-5	Methoxychlor			NR		
96-33-3	Methyl acrylate					
563-46-2	2-Methyl-1-butene				F (10,000)	
563-45-1	3-Methyl-1-butene				F (10,000)	
74-83-9	Methyl bromide (Bromomethane)			✓		
74-87-3	Methyl chloride (Chloromethane)			✓	T (10,000)	
71-55-6	Methyl chloroform (1,1,1,-Trichloroethane)	E		NR		I
79-22-1	Methyl chloroformate				T (5,000)	
8022-00-2	Methyl demeton					
115-10-6	Methyl ether				F (10,000)	
78-93-3	Methyl ethyl ketone (2-Butanone)			✓		
107-31-3	Methyl formate				F (10,000)	
74-88-4	Methyl iodide (Iodomethane)			NR		
108-10-1	Methyl isobutyl ketone (Hexone)			✓		
624-83-9	Methyl isocyanate			✓	T (10,000)	
74-93-1	Methyl mercaptan				T (10,000)	
80-62-6	Methyl methacrylate			✓		
1634-04-4	Methyl tert-butyl ether			✓		
556-64-9	Methyl thiocyanate				T (20,000)	
74-89-5	Methylamine				F (10,000)	
60-34-4	Methylhydrazine			✓	T (15,000)	
101-14-4	4,4-Methylene bis (2-chloroaniline)			NR		
75-09-2	Methylene chloride (Dichloromethane)			✓		
101-68-8	Methylenediphenyl diisocyanate (MDI)			✓		
101-77-9	4,4-Methylenedianiline			✓		
115-11-7	2-Methylpropene				F (10,000)	
75-79-6	Methyltrichlorosilane				T (5,000)	
91-20-3	Naphthalene			✓		
91-59-8	Beta-napthylamine					
13463-39-3	Nickel carbonyl				T (1,000)	
7440-02-0	Nickel and compounds			NR		
7697-37-2	Nitric acid (conc. 80% or greater)				T (15,000)	
10102-43-9	Nitric oxide				T (10,000)	
98-95-3	Nitrobenzene			✓		
92-93-3	4-Nitrobiphenyl			NR		
10102-44-0	Nitrogen dioxide	✓				
	Nitrogen oxides	✓	✓			
55-63-0	Nitroglycerine					
100-02-7	4-Nitrophenol			✓		
79-46-9	2-Nitropropane			✓		
684-93-5	n-Nitroso-N-methylurea			NR		
62-75-9	n-Nitrosodimethylamine			NR		
59-89-2	n-Nitroso morpholine			NR		

REGULATED POLLUTANTS

CAS No.	Pollutant Name	REGULATING PROGRAM				
		Criteria, (a)	NSPS	HAP, (b)	Accidental, (c)	ODS, (d)
8014-95-7	Oleum (Fuming sulfuric acid)			✓	T (10,000)	
10028-15-6	Ozone	✓				
56-38-2	Parathion			NR		
	Particulate matter (PM10)	✓				
82-68-8	Pentachloronitrobenzene (Quintobenzene)			NR		
87-86-5	Pentachlorophenol			NR		
504-60-9	1,3-Pentadiene				F (10,000)	
109-66-0	Pentane				F (10,000)	
109-67-1	1-Pentene				F (10,000)	
646-04-8	2-Pentene, (E)-				F (10,000)	
627-20-3	2-Pentene, (Z)				F (10,000)	
79-21-0	Peracetic acid				T (10,000)	
127-18-4	Perchloroethylene (Tetrachloroethylene)			✓		
594-42-3	Perchloromethylmercaptan				T (10,000)	
108-95-2	Phenol			✓		
106-50-3	p-Phenylenediamine			✓		
75-44-5	Phosgene			✓	T (500)	
7803-51-2	Phosphine			NR	T (5,000)	
7664-38-2	Phosphoric acid					
723-14-0	Phosphorus			NR		
10025-87-3	Phosphorus oxychloride				T (5,000)	
7719-12-2	Phosphorus trichloride				T (15,000)	
85-44-9	Phthalic anhydride			✓		
110-89-4	Piperidine				T (15,000)	
1336-36-3	Polychlorinated biphenyls (Aroclors)			NR		
	Polycyclic organic matter			✓		
463-49-0	Propadiene				F (10,000)	
74-98-6	Propane				F (10,000)	
1120-71-4	1,3-Propane sultone			✓		
57-57-8	beta-Propiolactone			✓		
123-38-6	Propionaldehyde			✓		
107-12-0	Propionitrile				T (10,000)	
114-26-1	Propoxur (Baygon)			NR		
109-61-5	Propyl chloroformate				T (15,000)	
115-07-1	Propylene				F (10,000)	
78-87-5	Propylene dichloride (1,2-Dichloropropane)			✓		
75-56-9	Propylene oxide			✓	T (10,000)	
75-55-8	Propyleneimine				T (10,000)	
75-55-8	1,2-Propylenimine (2-Methyl aziridine)			✓		
74-99-7	Propyne				F (10,000)	
110-86-1	Pyridine					
91-22-5	Quinoline			✓		
106-51-4	Quinone			✓		
	Radionuclides (including radon)			NR		
	Reduced sulfur compounds		✓			
7782-49-2	Selenium and compounds			NR		
7803-62-5	Silane				F (10,000)	
7440-22-4	Silver					
100-42-5	Styrene			✓		
96-09-3	Styrene oxide			NR		
7446-09-5	Sulfur dioxide	✓				
7446-09-5	Sulfur dioxide (Anhydrous)				T (5,000)	
7783-60-0	Sulfur tetrafluoride				T (2,500)	
7446-11-9	Sulfur trioxide				T (10,000)	
7664-93-9	Sulfuric acid mist		✓			
100-21-0	Terephthalic acid					
1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin			NR		
79-34-5	1,1,2,2-Tetrachloroethane			✓		
127-18-4	Tetrachloroethylene (Perchloroethylene)			✓		
116-14-3	Tetrafluoroethylene				F (10,000)	
75-74-1	Tetramethyllead				T (10,000)	
75-76-3	Tetramethylsilane				F (10,000)	

REGULATED POLLUTANTS

CAS No.	Pollutant Name	REGULATING PROGRAM				
		Criteria, (a)	NSPS	HAP, (b)	Accidental, (c)	ODS, (d)
509-14-8	Tetranitromethane				T (10,000)	
7550-45-0	Titanium tetrachloride			NR	T (2,500)	
108-88-3	Toluene			✓		
95-80-7	2,4-Toluenediamine			✓		
26471-62-5	Toluene diisocyanate (unspecified isomers)			NR	T (10,000)	
584-84-9	Toluene-2,4-diisocyanate				T (10,000)	
91-08-7	Toluene-2,6-diisocyanate				T (10,000)	
95-53-4	o-Toluidine			✓		
	Total reduced sulfur		✓			
	Total suspended particulate		✓			
8001-35-2	Toxaphene (Chlorinated camphene)			NR		
120-82-1	1,2,4-Trichlorobenzene			✓		
71-55-6	1,1,1-Trichloroethane (Methyl chloroform)	E		NR		I
79-00-5	1,1,2-Trichloroethane			✓		
79-01-6	Trichloroethylene			✓		
95-95-4	2,4,5-Trichlorophenol			✓		
88-06-2	2,4,6-Trichlorophenol			✓		
10025-78-2	Trichlorosilane				F (10,000)	
121-44-8	Triethylamine			✓		
79-38-9	Trifluorochloroethylene				F (10,000)	
1582-09-8	Trifluralin			NR		
75-50-3	Trimethylamine				F (10,000)	
755-77-4	Trimethylchlorosilane				T (10,000)	
540-84-1	2,2,4-Trimethylpentane			✓		
7440-62-2	Vanadium (fume or dust)					
108-05-4	Vinyl acetate			✓		
108-05-4	Vinyl acetate monomer				T (15,000)	
689-97-4	Vinyl acetylene				F (10,000)	
593-60-2	Vinyl bromide			NR		
75-01-4	Vinyl chloride			✓	F (10,000)	
109-92-2	Vinyl ethyl ether				F (10,000)	
75-02-5	Vinyl fluoride				F (10,000)	
107-25-5	Vinyl methyl ether				F (10,000)	
75-35-4	Vinylidene chloride (1,1-Dichloroethylene)			✓	F (10,000)	
75-38-7	Vinylidene fluoride				F (10,000)	
	Volatile organic compounds (VOC)	✓	✓			
1330-20-7	Xylenes (isomers and mixture)			✓		
108-38-3	m-Xylene			✓		
95-47-6	o-Xylene			✓		
106-42-3	p-Xylene			✓		
7440-66-6	Zinc compounds					

(a) E - indicates the chemical is exempt as a VOC (Ozone Precursor) - see next page.
(b) A check-mark designates a regulated HAP; NR means it is listed as a HAP but not regulated under 40 CFR PARTS 61 or 63.
(c) F and T designate flammable (F) and toxic (T) ACCIDENTAL Release Substances as given in Tables 1 and 3 40 CFR PART 68 (January 31,1994). Threshold quantities shown in parentheses are expressed in pounds.
(d) I and II designate class I and class II ODS. The list of Ozone Depleting Chemicals in FR Vol. 58 No. 236 als includes Methyl Bromide and 34 other HBFCs not on this list.

APPENDIX B

EMISSION INVENTORY RAW DATA FROM MALMSTROM AFB

RAW DATA

SECTION 2 - ABRASIVE BLASTING

SUMMARY

Abrasive Blasting

Building Location	Type	Type of bead/sand	Control device	Control Efficiency%	Stack Test Results Avail ?	1999 Abrasive used(lb)	1999 Abrasive diposed as waste(lb) [1]
200	INEX	GLASS BEAD	VACUUM		—	100	20 gallons
81120		"	Cyclone		—	2000	170 gallons
1870	SPONGE BLAST	SPONGE MEDIA	BAG FILTER	~98%	—	6000	825 gallons + 7, 55-gal DRUMS FILTERS
1890		GLASSBEAD	BAG FILTER		—	1500	? 0
1222	SNAP-ON BEAD	GLASSBEAD			—	50	
3075	AEROLUTE	PLASTIC	CABINET w/Reclaimer		—	15 gal/month	Recycled
471		GLASS	" + cyclone		—		2, 55-gal DRUMS

[1] - Or provide the amount collected in the baghouse/cyclone during 1999 (whichever is greater)

USES Ballotini Impac BEADS

Ck HAZMART or call TSGT. MARTIN 6240 OR TSGT. BOSER 6227

UNKNOWN

870
1450 } GS
1248

NOTE:

If MSDS Info Req'd - see Randall Cook for HAZMART INFO.

RAW DATA

SECTION 4 – CLASSIFIED DOCUMENT INCINERATOR

From: Stephens, Marty
Sent: Thursday, July 13, 2000 7:22 AM
To: Heckler, David
Cc: Nowak, Matthew A SMSgt 341CS/SCB; Haines-Jessel, Cassandra A SMSgt 341CS/SCBX
Subject: FW: Air Emission Inventory Data Request-14 DAY SUSPENSE

Dave: As with the annual input for the Air Quality Permit Report, the information for the attached report was extracted for the destruction log completed by the users. Please call if you have any questions concerning the data.
Marty

-----Original Message-----
From: Heckler, David
Sent: Wednesday, July 05, 2000 3:53 PM
To: Vazquez, Antonio G MSgt 341SFS/SFTC; Holmes, Clifford; Vanderploeg, Daniel; Grieve, Frank; Hodges, James; Morris, James 341CES/CEV; Chestnutt, Jimmy 341CES; Koger, Kenneth; Boser, Mark E TSgt 341CES/CEOHVM; Stephens, Marty; Foran, Michael; Murray, Michael 341CES; Cavuto, Rick; Garrison, Robert K TSgt 341CES/CEF; Madison, Rodney L MSgt 819RHS/RMV; Dalton, Scott F MSgt 341CES/CED; Cote, Thomas W WS6 341TRNS; Reese, Willie
Subject: Air Emission Inventory Data Request-14 DAY SUSPENSE

Attached is a memorandum requesting air source emission data from your organization. Please complete the attached Excel spreadsheet as per the instructions and return it to me by 19 July 2000. I appreciate your prompt attention to this matter.

Dave Heckler
Environmental Engineer

Incinerators

	Classified Waste Incinerator (CWI)	Medical Waste Incinerator (MWI)
Data Needs per Incinerator:		
Location	Building 547	
Make		Dual-chamber, two-burner air controlled
Model #	C-120	C52P
Manufacturer	Consumat	Consumat
Actual Emissions (if known)		
Type of Waste Burned	7 (classified documents, misc. paper waste, Mylar tape and ribbons	0
Rated Capacity (lb/hr)	435 - 560 (120 cf)	85
Loads burned (No./yr)	3	--
Quantity Burned (lbs/load)		--
Quantity Burned (lbs/yr)	605	--
Operating Hours in 1999:		
hours/day	3	
days/year	3	
Control Device (yes/no):	Yes	
Control Device (Make)	Two-Chamber	
Control Device (Model)		
Control Device (Manufacturer)		

RAW DATA

SECTION 5 – COAL STORAGE AND HANDLING

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 • TEL: 708-953-9300 FAX: 708-953-9306
SINCE 1908
SGS Member of the SGS Group (Société Générale de Surveillance)

PLEASE ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 544, SOMERSET, CO 81434
TEL: (970) 929-5022
FAX: (970) 929-5023

December 6, 1999

OXBOW CARBON & MINERALS, INC
7901 Southpark Plaza
Suite 202
Littleton CO 80120

Sample identification by
TERROR CREEK COMPANY

MALMSTROM

1 1/4" X 1/4"

SHIPMENT OF 11/30/99

TOTAL WEIGHT OF COAL
SIEVED: 363 LBS

CONT. #: SPO600-98-D-0670
ORDER #: 6TA2
SHIPMENT #: 3Z

Kind of sample reported to us: COAL

Sample taken at: TERROR CREEK COMPANY

Sample taken by: TERROR CREEK COMPANY

Date sampled: ------

Date received: November 29, 1999

Analysis report no. 56-16359

SIEVE ANALYSIS

PASSING	RETAINED	PERCENT	CUMULATIVE PERCENT
	1 1/4" RND	1.02	1.02
1 1/4" RND	1/4" RND	95.78	96.80
1/4" RND	------	3.20	100.00

PROXIMATE ANALYSIS (on recombined total)

	As Received	Dry Basis
% Moisture	7.30	xxxxx
% Ash	8.09	8.73
% Volatile	35.90	38.73
% Fixed Carbon	48.71	52.54
Btu/lb	12145	13101
% Sulfur	0.49	0.53

Moisture, Ash-Free Btu = 14354
Pounds of SO_2 per 10^6 Btu = 0.81
Pounds of Sulfur per 10^6 Btu = 0.40

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Somerset Laboratory

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 • TEL. 630-953-9300 FAX: 630-953-9306
SINCE 1908
SGS Member of the SGS Group (Societe Generale de Surveillance)

ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 544
SOMERSET, CO 81434
TEL: (970) 929-5022
FAX: (970) 929-5023

November 18, 1999

OXBOW CARBON & MINERALS, INC
7901 Southpark Plaza
Suite 202
Littleton CO 80120

Sample identification by
TERROR CREEK COMPANY

CONTRACT: MALSTRUM

1 1/4" X 1/4"

SHIPMENT OF 11/17/99

TOTAL WEIGHT OF COAL
SIEVED: 372 LBS

CONT. #: SP0600-98-D-0670
ORDER #: 6TA2
SHIPMENT #: 02

Kind of sample reported to us: COAL

Sample taken at: TERROR CREEK COMPANY

Sample taken by: TERROR CREEK COMPANY

Date sampled: ------

Date received: November 12, 1999

Analysis report no. 56-16206

SIEVE ANALYSIS

PASSING	RETAINED	PERCENT	CUMULATIVE PERCENT
	1 1/4" SQR	0.57	0.57
1 1/4" SQR	1/4" SQR	97.01	97.58
1/4" SQR	-----	2.42	100.00

PROXIMATE ANALYSIS (on recombined total)

	As Received	Dry Basis
% Moisture	7.69	xxxxx
% Ash	9.67	10.48
% Volatile	35.30	38.24
% Fixed Carbon	47.34	51.28
Btu/lb	11787	12769
% Sulfur	0.49	0.53

Moisture, Ash-Free Btu = 14264
Pounds of SO_2 per 10^6 Btu = 0.83
Pounds of Sulfur per 10^6 Btu = 0.42

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Somerset Laboratory

MEMBER

COMMERCIAL TESTING & ENGINEERING CO.

GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 • TEL: 630-953-9300 FAX: 630-953-9306

SINCE 1908

SGS Member of the SGS Group (Société Générale de Surveillance)

ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 544
SOMERSET, CO 81434
TEL: (970) 929-5022
FAX: (970) 929-5028

November 5, 1999

OXBOW CARBON & MINERALS, INC
7901 Southpark Plaza
Suite 202
Littleton CO 80120

Sample identification by
TERROR CREEK COMPANY

MALSTROM

1-1/4" X 1/4"

SHIPMENT OF 11/05/99

TOTAL WEIGHT OF COAL
SIEVED: 430.20 LBS

CONT. #:SP0600-98-D-0659
ORDER #:6TA2
SHIPMENT #:01

Kind of sample reported to us: COAL

Sample taken at: TERROR CREEK COMPANY

Sample taken by: TERROR CREEK COMPANY

Date sampled: -----

Date received: November 2, 1999

Analysis report no. 56-16114

SIEVE ANALYSIS

PASSING	RETAINED	PERCENT	CUMULATIVE PERCENT
	1 1/4" RND	1.86	1.86
1 1/4" RND	1/4" RND	96.01	97.87
1/4" RND	------	2.13	100.00

Y 2000 coal order

PROXIMATE ANALYSIS (on recombined total)

	As Received	Dry Basis
% Moisture	7.84	xxxxx
% Ash	9.58	10.40
% Volatile	35.04	38.02
% Fixed Carbon	47.54	51.58
Btu/lb	11781	12783
% Sulfur	0.48	0.52

Moisture, Ash-Free Btu = 14267
Pounds of SO_2 per 10^6 Btu = 0.81
Pounds of Sulfur per 10^6 Btu = 0.41

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Somerset Laboratory

MEMBER

→ JERRY

Coal Handling

- train Delivery
- Car Belly Dumps into pile
- pit transferred to Heat Plant Via Enclosed Conveyor

Coal Storage

~1200 tons on-site

Pile is Avg.
~8-10' high

- USE 50 tons/Day average

LIME

- pit dredged 2x/yR → 200cf Dumpster
- Exterior Dump

RAW DATA

SECTION 6 – EQUIPMENT LEAKS

Equipment Leaks

1. Inventory of Equipment

	Location: -JP-8 (FILL STAND)	Location: MILITARY STATION (DIESEL) VENT on ea. tank - 1/2
Loading Pier:		
Number of Valves:	22	~~8~~ 5
Number of Pumps and Rating:	5	2
Number of Sample Connections:	12	~~1~~ 2
Number of Pressure Relief Valves:	26	2

~~2. The type of fuel contained in each different fuel distribution equipment:~~

	Diesel TANK (450K gal)	MILITARY STATION (GASOLINE) Vent on tank
Loading Pier:		
Valves:	16	3
Pumps:	5	1
Sample Connections:	3	Ø
Pressure Relief Valves:	4	1

2. The type of ~~fuel contained in each different fuel distribution equipment:~~

		20,000 gal (Gasoline)
Loading Pier:		
Valves:		6
Pumps:		2
Sample Connections:		Ø
Pressure Relief Valves:		Ø

(7) Pump Seals? Assume 1 per pump?

	GAS TOTAL	Diesel total	JP8
V	9	21	22
P	3	7	5
SC	Ø	5	12
PRV	1	6	26
Flanges	26	80	130

2x each

..D.SEQUENCE=BLD. 430.AND.DATE>=19990101.AND.DATE<=19991231 .AND. !deleted = 7 Total = 72,745 Optimization Level - Full

DATE	GRADE	ISS PT	SERIAL	QUANTIT	MDS	TAIL NUMBER	CIC	BUYERS DODA	NON FLY ORG	TID
01/12/1999	DL1		0	7102				FP4626		
01/21/1999	DL1		0	7094				FP4626		
01/29/1999	DL1		0	6083				FP4626		
02/08/1999	DL1		0	5066				FP4626		
02/12/1999	DL1		0	5073				FP4626		
02/23/1999	DL1		0	7068				FP4626		
03/17/1999	DL1		0	6076				FP4626		
				43562						

MVR isolation

Ball valves 4 (2 closed)

Non-surge Check valves (1 per pump) total 2

Offload 2 @ each pump (3 total ~~Sample connections~~)

OK

Diesel & MVR

- 2 tanks @ 500 station (10000 gal. 11-wall AST) (10000 gallon tanks)
- tanker truck pumps to station tanks

offload 50 gpm pumps (most closed stripper pump not hose)

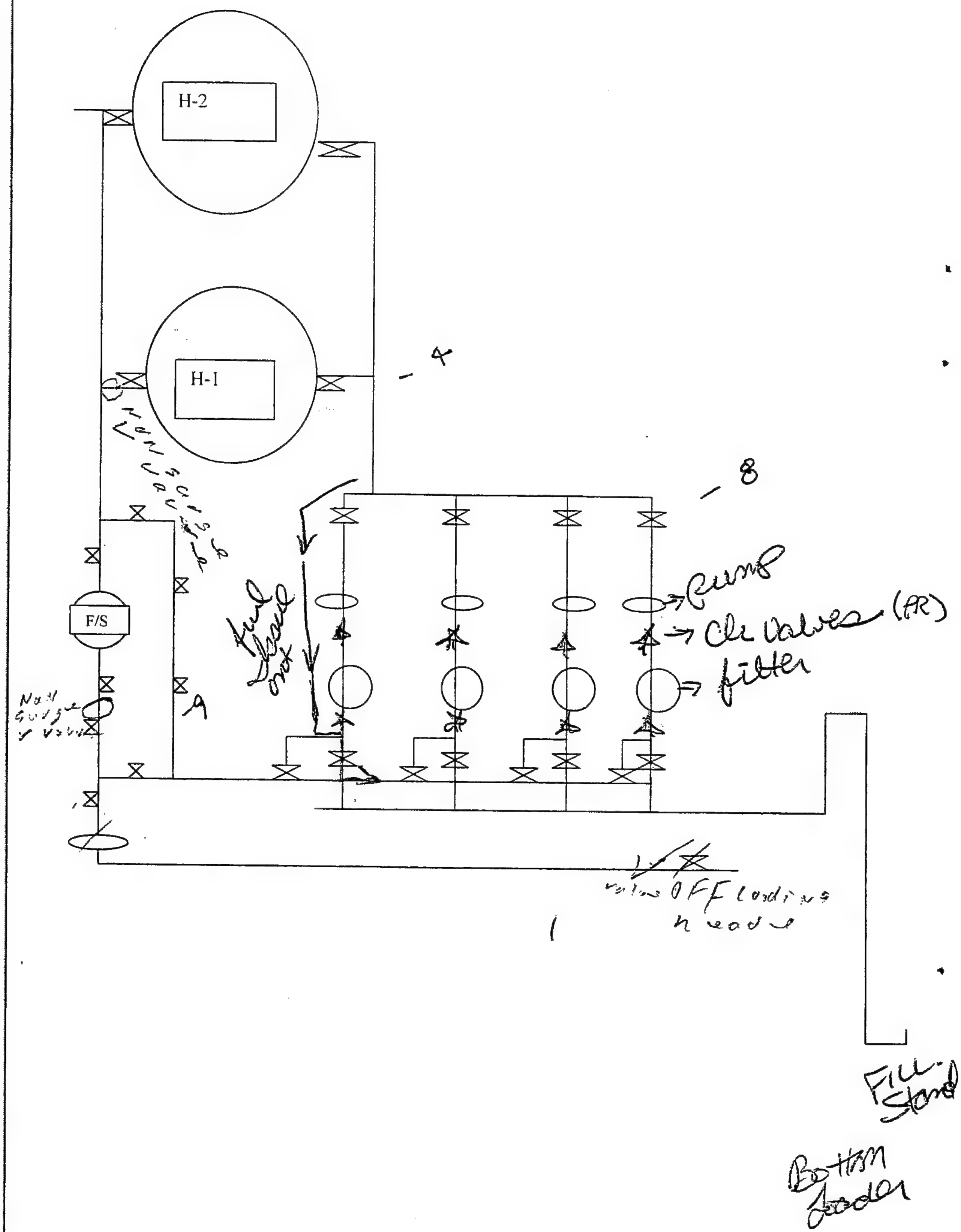
3 Ball valves → +

Check valve for fill

1 " " @ Dispenser

- MVR no Sample Conn.
- Diesel (1) sample connection

Count: 7


H-2
H-1
F/S
pump
filter
Fill Stand

RAW DATA

SECTION 7 – EXTERNAL COMBUSTION SOURCES

[illegible]

						FY99		EEIC: 48030	
TITLE: ENERGY WEST RESOURCES - GAS COMMODITY								PSR	
								DSR	
	WO#: 99931						CAC: 21030		
MONTH	CUM TOTAL	EST DIFF	EST #	INCREASE AF9/DATE	VCHR #		COST	MCFs CONS	UNIT COST
OCT	$61,638.42	$9,641.42	$51,997.00	4-Jan	87009		$61,638.42 ✓	38687	1.593259
NOV	$128,295.16	$8,656.74	$58,000.00	4-Jan	97388		$66,656.74 ✓	51217	1.301457
DEC	$199,124.56	**$20,804.40**	$50,025.00	2-Feb	97389		$70,829.40 ✓	40044	1.768789
JAN	$265,738.74	**$15,603.18**	$51,011.00	23-Feb	107467		$66,614.18 ✓	37179	1.791715
FEB	$322,448.39	**$3,124.40**	$53,585.25	15-Mar	NOTE		$56,709.65 ✓	20305	2.792891
MAR	$382,939.55	$11,096.16	$49,395.00	19-Apr	145550		$60,491.16 ✓	19585	3.088647
APR	$443,699.89	$3,040.34	$57,720.00	19-May	150725		$60,760.34 ✓	28148	2.158602
MAY	$521,034.73	$16,543.84	$60,791.00		159719&191806		$77,334.84 ✓	38115	2.028987
JUN	$596,615.07	**$25,075.34**	$50,505.00	21-Jul	184235		$75,580.34 ✓	9760	7.743887
JUL	$673,949.91	($3,063.66)	$80,398.50		203391		$77,334.84 ✓	6060	12.76152
AUG	$757,412.07	$0.00	$83,462.16		2813		$83,462.16 ✓	5917	14.10549
SEP	$839,293.16	$4,076.09	$77,805.00		27537		✓ $81,881.09	37050	2.210016
CUML		$114,598.25	$724,694.91				$839,293.16	332067	2.527481

NOTE: WHEN BILLING PROCESSES MONTHLY, DO COST TRANSFERS TO WO#'S 99932, 99933, 99934, 99935 IN WIMS.

FORM 9

NOTE: THESE BILLS WERE PROCESSED ERRONEOUSLY AND CORRECTED, VCHR# 129569 AND CORRECTED ON 3/17 ON CS001232
PAID OUT ON 18 MAY 99 ON SM000540. TWO PAYMENTS $3,124.40 & $53,585.25
ON MAY 27TH VCHR CS001287 WAS PROCESSED FOR $3,124.40 & $53,585.25
Day 9195 CS001485 for -$77334.84
day 9235: SM744, feb's bill of $56,709.65 ???

1999

9 months = 202,119

~~12 months~~ = $\frac{12}{9} x$

= 269,492

Housing & Trailer Park

		FY99			EEIC: 48030	
LE: ENERGY WEST GAS COMMODITY - MFH & TRLR						
WO#: 99933		RC/CC: 234468		CAC: 72811/72812		
	CUM	COST			MCF	UNIT
MONTH	TOTAL	TRANS	VCHR #	COST	CONS	COST
		(WIMS)				
OCT	$13,115.55	28-Jan-99		$13,115.55	8231.9	1.593259
NOV	$26,516.40	29-Jan-99		$13,400.85	10296.8	1.301458
DEC	$65,263.50	17-Mar-99		$38,747.10	21906	1.768789
JAN	$87,558.71	17-Mar-99		$22,295.21	12443.5	1.791715
FEB	$128,004.79	17-Mar-99		$40,446.08	14481.8	2.79289
MAR	$161,865.01	19-Apr-99		$33,860.22	10962.8	3.088647
APR	$183,907.15	19-May-99		$22,042.14	10211.3	2.158603
MAY	$202,253.25	7-Jun-99		$18,346.10	9042	2.028987
JUN	$227,189.01	22-Sep-99		$24,935.76	3235.9	7.705974
JUL	$271,152.95	22-Sep-99		$43,963.94	3438.3	12.78653
AUG	$278,873.42			$7,720.47	3985.5	1.93714 Transport
SEP	$320,632.27			$41,758.85	6045.2	6.90777
CUML				$320,632.27	114281	2.805648
NOTE: COSTS TRANSFERRED FROM WO# 99931						RRI: QK

1999

9 mo 73,846.3

12 mo = 12/9 x 73,846.3

= 98,461.7

FY99 EEIC: 48030

TITLE: ENERGY WEST GAS COMMODITY - HOSPITAL

WO#: 99932 RC/CC: 234468 ~~CAC:~~ 21030

MONTH	CUM TOTAL	COST TRANS (WIMS)	VCHR #	COST	MCF CONS	UNIT COST
OCT	$486.10	28-Jan		486.10	305.1	1.593248
NOV	$486.88	29-Jan		0.78	0.6	1.3
DEC	$487.23	17-Mar		0.35	0.2	1.75
JAN	$487.77	17-Mar		0.54	0.3	1.8
FEB	$488.61	17-Mar		0.84	0.3	2.8
MAR	$1,117.46	19-Apr		628.85	203.6	3.088654
APR	$1,436.07	19-May-99		318.61	147.6	2.158604
MAY	$1,713.64	7-Jun		277.57	136.8	2.02902
JUN	$5,541.64	22-Sep-99		3,828.00	498.9	7.67288
JUL	$12,978.47	22-Sep-99		7,436.83	585	12.71253
AUG	$13,776.79			798.32	412.1	1.9372
SEP	$18,689.60			4,912.81	776	6.330941
CUML				$18,689.60	3066.5	6.094766

Transport

NOTE: COST TRANSFERRED FROM WO#99931 RRI: F

FY99					EEIC: 48030	
TITLE: ENERGY WEST GAS COMMODITY - BASE (82%)						
WO#: 99934		RC/CC: 234468			CAC: 21030	
		DATE				
	CUM	COST			MCF	UNIT
MONTH	TOTAL	TRANS	VCHR #	COST	CONS	COST
		(WIMS)				
OCT	$39,390.15	28-Jan-99		39,390.15	24723	1.593259
NOV	$83,059.38	29-Jan-99		43,669.23	33554.1	1.301457
DEC	$109,366.58	17-Mar-99		26,307.20	14873	1.768789
JAN	$145,707.76	17-Mar-99		36,341.18	20282.9	1.791715
FEB	$159,043.26	17-Mar-99		13,335.50	4774.8	2.792892
MAR	$180,365.12	19-Apr-99		21,321.86	6903.3	3.088647
APR	$211,852.87	19-May-99		31,487.75	14587.1	2.158602
MAY	$259,996.06	7-Jun-99		48,143.19	23727.7	2.028987
JUN	$298,423.17	22-Sep-99		38,427.11	4940.7	7.777665
JUL	$319,707.53	22-Sep-99		21,284.36	1670.1	12.74436
AUG	$381,161.09			61,453.56	1245.9	49.32463
SEP	$409,819.12			28,658.03	4205.6	6.814255
CUML				$409,819.12	155488.2	2.635693
NOTE: COSTS ARE TRANSFERRED FROM WO# 99931						

Transport

		FY99		EEIC: 48030	
TITLE: ENERGY WEST GAS COMMODITY - BASE (18%)					
WO#: 99935		RC/CC: 234468		CAC: 23040	
MONTH	CUM TOTAL	COST TRANS (WIMS)	COST	MCF CONS	UNIT COST
OCT	$8,646.62	28-Jan-99	$8,646.62	5427	1.59326
NOV	$18,232.50	29-Jan-99	$9,585.88	7365.5	1.301457
DEC	$24,007.25	17-Mar-99	$5,774.75	3264.8	1.768791
JAN	$31,984.50	17-Mar-99	$7,977.25	4452.3	1.791714
FEB	$34,911.73	17-Mar-99	$2,927.23	1048.1	2.792892
MAR	$39,591.96	19-Apr-99	$4,680.23	1515.3	3.088649
APR	$46,503.80	19-May-99	$6,911.84	3202	2.158601
MAY	$57,071.78	7-Jun-99	$10,567.98	5208.5	2.028987
JUN	$65,461.25	22-Sep-99	$8,389.47	1084.5	7.735795
JUL	$70,110.96	22-Sep-99	$4,649.71	366.6	12.68333
AUG	$83,600.77		$13,489.81	273.5	49.32289
SEP	$90,151.17		$6,550.40	923.2	7.095321
CUML			$90,151.17	34131.3	2.641305
NOTE: COSTS ARE TRANSFERRED FROM WO# 99931					

Transport

ORIGINAL

External Combustion - Boilers

	Unit	Location	Make	Model #	Manufacturer	Stack Test Available (Y/N)	1999 Operating Hours	Fuel Type	Coal sulfur%	No. of Units	Rated Capacity MMBtu/hr	Amount of fuel burned in 1999	Control device (Y/N)	Type of Control	Efficiency%
	Boiler #1	Central Heating Plant	Detroit Spreader Stoker Travel Grate		Detroit Stoker Company	Y		coal/NG		1	85		Y	Dry Lime Scrubber/ Baghouse	85/99
	Boiler #2	Central Heating Plant	Coen NG burner (retrofitted coal boiler)			Y		coal/NG		1	35		Y	Dry Lime Scrubber/ Baghouse	85/99
	Boiler #3	Central Heating Plant	Detroit RotoGrate Stoker		Detroit Stoker Company	Y		coal/NG		1	85		Y	Dry Lime Scrubber/ Baghouse	85/99
	~~B1075 Boiler~~	B1075						NG							
	Hot Water Heater	FH				N		NG		25	~~0.199~~		N		
	Furnace	FH				N		NG		92	0.08				
	Furnace	FH				N		NG		200	0.088				
	Water Heater	FH				N		NG		1250	0.0345				
	Furnace	FH				N		NG		60	0.1				
	Water Heater	FH				N		NG		74	0.04				
	Furnace	FH				N		NG		1036	0.06				
	Furnace	FH				N		NG		4	0.15				
	Water Heater	FH				N		NG		4	0.004				
4	Steam Boiler	B165				N		NG		1	2.643				
4	Hot Water Boiler	B330				N		NG		1	0.174				
12	Hot Water Boiler	B370				N		NG		1	0.4				
9	Hot Water Boiler	B448				N		NG		1	0.394				
12	Hot Water Boiler	B473				N		NG		1	0.423				
9	Hot Water Boiler	B737				N		NG		1	1.874				
STm 4	~~Hot Water Boiler~~	B766	Steam			N		NG		1	5.976				
4	Steam Boiler	B1010				N		NG		1	~~1.948~~	1.445			
4	Steam Boiler	B1020				N		NG		1	0.255				
4	Steam Boiler	B1020				N		NG		1	2.386				
4	Steam Boiler	B1075				N		NG		1	11.954				
9	~~Steam Boiler~~ HW	B1222				N		NG		1	0.429				
12	Steam Boiler HW	B1240				N		NG		1	1.5				
4	Steam Boiler HW	B1320				N		NG		1	0.23				
9	Hot Water Boiler	B1840				N		NG		1	3.634				
9	Hot Water Boiler	B1840				N		NG		1	1.549				
9	Hot Water Boiler	B1845				N		NG		1	0.49				
9	Hot Water Boiler	B1867				N		NG		1	0.349				
9	Steam Boiler HW	B1869				N		NG		1	0.571				
9	Steam Boiler HW	B1879				N		NG		1	0.391				
4	Steam Boiler	B2040				N		NG		1	5.714				
12	Steam Boiler HW	B2041				N		NG		1	0.134				
9	Steam Boiler	B3063				N		NG		1	4.781		N		
	~~Steam Boiler~~	~~B3070~~				~~N~~		~~NG~~		~~1~~	~~0.571~~				
9	Hot Water Boiler	B9001				N		NG		1	1.625				

1 — months of use X 24 HRS EACH

99.85

Heat Plant
3 large boilers

External Combustion - Boilers

Unit	Location	Make	Model #	Manufacturer	Stack Test Available (Y/N)	1999 Operating Hours	Fuel Type	Coal sulfur%	No. of Units	Rated Capacity MMBtu/hr	Amount of fuel burned in 1999	Control device (Y/N)	Type of Control	Efficiency%
Boiler #1	Central Heating Plant	Coen NG burner/Detroit RotoGrate Stoker		I.B.W. Detroit Stoker Company	Y	3720 HRS	coal/NG	UNDER 1%	1	85	85957.7 MCF/NG 245.1 T. COAL	Y	Dry Lime Scrubber/ Baghouse	85/99
Boiler #2	Central Heating Plant	Coen NG burner		INTERNATIONAL BOILER WORKS (I.BW)	? Y	3432 HRS	NG	N/A	1	35	81869.6 MCF/NG	Y	N/A	85/99
Boiler #3	Central Heating Plant	Detroit RotoGrate Stoker		I.B.W. Detroit Stoker Company	Y	2208 HRS	coal/NG	UNDER 1%	1	85	4769.09 T. COAL	Y	Dry Lime Scrubber/ Baghouse	85/99
~~B1075 Boiler~~	B1075						NG							
Hot Water Heater	FH				N		NG		25	0.199				
Furnace	FH				N		NG		92	0.08				
Furnace	FH				N		NG		200	0.088				
Water Heater	FH				N		NG		1250	0.0345				
Furnace	FH				N		NG		60	0.1				
Water Heater	FH				N		NG		74	0.04				
Furnace	FH				N		NG		1036	0.06				
Furnace	FH				N		NG		4	0.15				
Water Heater	FH				N		NG		4	0.004				
Steam Boiler	B165				N		NG		1	2.643				
Hot Water Boiler	B330				N		NG		1	0.174				
Hot Water Boiler	B370				N		NG		1	0.4				
Hot Water Boiler	B448				N		NG		1	0.394				
Hot Water Boiler	B473				N		NG		1	0.423				
Hot Water Boiler	B737				N		NG		1	1.874				
Hot Water Boiler	B766				N		NG		1	5.976				
Steam Boiler	B1010				N		NG		1	1.943				
Steam Boiler	B1020				N		NG		1	0.255				
Steam Boiler	B1020				N		NG		1	2.386				
Steam Boiler	B1075				N		NG		1	11.954				
Steam Boiler	B1222				N		NG		1	0.429				
Steam Boiler	B1240				N		NG		1	1.5				
Steam Boiler	B1320				N		NG		1	0.23				
Hot Water Boiler	B1840				N		NG		1	3.634				
Hot Water Boiler	B1840				N		NG		1	1.549				
Hot Water Boiler	B1845				N		NG		1	0.49				
Hot Water Boiler	B1867				N		NG		1	0.349				
Steam Boiler	B1869				N		NG		1	0.571				
Steam Boiler	B1879				N		NG		1	0.391				
Steam Boiler	B2040				N		NG		1	5.714				
Steam Boiler	B2041				N		NG		1	0.134				
Steam Boiler	B3063				N		NG		1	4.781				
Steam Boiler	B3070				N		NG		1	0.571				
Hot Water Boiler	B9001				N		NG		1	1.625				

ORIGINAL

~~External Combustion Generators~~

DIESEL-FIRED (Up to 447 kW or 600 hp)

Number of Units	Owner	Serial #	Model #	Manufacturer	Building	Rated Output, kW	Typical Load, kW	1999 Operating Hours	Type of Fuel Combusted
1	Base			Unknown	200	5			Diesel
1	Base			Unknown	Portable	6			Diesel
1	Base	F880130499		ONAN	200	15			Diesel
1	Base	H900340891		ONAN	200	15			Diesel
1	Base			Unknown	295	15			Diesel
1	Base	H900340892		ONAN	910	15			Diesel
1	Base	860984		GENERAC	1320	20			Diesel
1	Base	341188		US MOTOR CORP	300	20			Diesel
1	Base	L870951713		ONAN	530	20			Diesel
1	Base	E910391396		ONAN	1092	20			Diesel
1	Base	376-336		EMPIRE	1700	30			Diesel
1	Base	F820624909		ONAN	349	30			Diesel
1	Base	F8206249		ONAN	1879	32			Diesel
1	Base	G93051468		ONAN	1881	35			Diesel
1	Base			Unknown	200	60			Diesel
1	Base	B60573		DMT	407	60			Diesel
1	Base	234660		CUMMINS	248	60			Diesel
1	Base	BW00119		FOSTER ENTERPRISE	200	100			Diesel
1	Base			Unknown	Portable	100			Diesel
1	Base	183788		CUMMINS	360	100			Diesel
1	Base	1950585433		ONAN	1996	100			Diesel
1	Base	E920470279		CUMMINS	249	100			Diesel
1	Base	A920445325		ONAN	1440	100			Diesel
1	Base	220030		CUMMINS	1082	125			Diesel
1	Base			Unknown	3080	155			Diesel
1	Base	66D48062		CATERPILLAR	160	175			Diesel
1	Base	A9300496939		ONAN	1711	175			Diesel
1	Base	85Z01446		CATERPILLAR	152	200			Diesel
1	Base			Unknown	Portable	200			Diesel
1	Base			Unknown	Portable	200			Diesel
1	Base			Unknown	Portable	200			Diesel
1	Base			Unknown	1459	200			Diesel
1	Base			Unknown	1459	200			Diesel
1	Base			Unknown	1459	200			Diesel
1	Base	30305858		CUMMINS	1884	200			Diesel
1	Base			Unknown	145	250			Diesel
1	Base	J882139997		CATERPILLAR	1075	300			Diesel
1	Red Horse			Unknown	1460	4			Diesel
22	Red Horse			LIPS	1450	3			Diesel
7	Red Horse			MEP-802	1450	5			Diesel
	Red Horse			MEP-804	1450	10			Diesel
4	Red Horse			MEP-805	1450	30			Diesel
	Red Horse			MEP-806	1450	60			Diesel
1	Red Horse			MEP-007	1450	100			Diesel
3	Red Horse			TF-1	1450	6			Diesel
	Red Horse			MEP-009	1450	200			Diesel

eater than 447 kW or 600 hp)

1	Base	99291		CUMMINS	1831	510			Diesel
1	Base	RU190Y8		WAUKESHA	82110	940			Diesel
1	Base	81208007		CATERPILLAR	2040	500			Diesel
1	Base			Unknown	1482	500			Diesel
1	Base	G880140225		CUMMINS	500	500			Diesel

RAW DATA

SECTION 8 – FIRE FIGHTER TRAINING

Fire Fighting

Type of Fuels Burned	Quantity of Fuel Burned in 1999	Location
Propane	4,700 gallons	Bldg. 1888
Hay/Straw	10 Bails	Bldg. 1886
Wood pallets	10 Pallets	Bldg. 1886

RAW DATA

SECTION 9 – FUEL SPILLS

Fuel (or other) Spills

Date	Material Spilled	Quantity of Material Spilled	Quantity of Material Recovered	Location
14-Jun-99	Diesel Fuel	~20 gallons	0 gal / All absorbed into the asphalt	Bldg 308[illegible]
21-Apr-99	Hydraulic Fluid	~1 gallon	1 gal / cleaned up w/ absorbent	Clinic Lot
20-Jul-99	Gasoline	1 pint	1 pint / cleaned up w/ spill pads	Bldg. 47[illegible]
9-Jul-99	Motor Oil		cleaned up w/ absorbents	Dorm 737 L[illegible]
10-Aug-99	Hydraulic Fluid	14–19 gallons	0 gal / All absorbed into the gravel	Rivet Mil[illegible]
			The soil was later excavated and sent to landFarm	
[illegible]-Oct-99	Diesel Fuel	~1 gallon	1 gal / spill contained & cleaned up	Military gas station
2[illegible]-Sept-99	Diesel Fuel	~1 gallon	1 gal / absorbed by absorbents	Military gas station

RAW DATA

SECTION 10 – FUEL STORAGE

MALMSTROM AFB
ABOVEGROUND STORAGE TANKS

BLDG/ FAC.	USER	EQUIPMENT	INSTALLATION	TANK TYPE	CONTAINMENT	FUEL	CAPACITY (gallons)
1468	Red Horse	Vehicle	Above Ground	Steel	SCAT	Diesel	2,000
1470	Red Horse	Vehicle	Above Ground	Steel	SCAT	Gasoline	1,000
1482	POL Distribution	Generator	On Equipment	Steel	Double Wall	Diesel	500
1831	Weapons Storage Area	Generator	Below Ground			Diesel	6,000
1831	Weapons Storage Area	Vehicle	Above Ground	Steel		Gasoline	500
1831	Weapons Storage Area	Generator		Steel		Diesel	295
1839	Weapons Storage Area	Generator	On Equipment	Steel	Double Wall	Diesel	300
1845	Missile Handling	Generator	On Equipment	Steel	Double Wall	Diesel	100
1879	Receiver Site	Generator	Above Ground	Steel	SCAT	Diesel	2,000
1881	TACAN	Generator	Inside Building	Steel	Inadequate Metal Catch Basin	Diesel	120
1884	South Airfield Lights	Generator	Above Ground	Steel	Concrete Catch Basin	Diesel	2,500
1890	Rivet Mile	Vehicles	Above Ground	Steel	Portable Metal Box With 2 Tanks	Diesel	100
1890	Rivet Mile	Vehicles	Above Ground	Steel	Portable Metal Box With 2 Tanks	Gasoline	100
1996	Sewage Lift	Generator	On Equipment	Steel	Double Wall	Diesel	200
2040	Clinic	Generator	Below Ground			Diesel	8,000
2040	Clinic	Generator	Above Ground	Steel		Diesel	295
3080	Fire Pump	Generator	On Equipment	Steel	Double Wall	Diesel	300
13415	Empty	Generator	Above Ground	Steel	Concrete Catch Basin	Diesel	?
82110	Heat Plant	Generator	Above Ground	Steel	SCAT	Diesel	6,000
41100		Storage		Steel	Concrete Catch Basin	JP-8	
41101		Storage		Steel	Concrete Catch Basin	Diesel	
41102		Storage		Steel	Concrete Catch Basin		
41120		Storage		Steel	Concrete Catch Basin		
41121		Storage		Steel	Concrete Catch Basin		

SW = Single Wall
WO = Work Order

MALMSTROM AFB
ABOVEGROUND STORAGE TANKS

BLDG/ FAC	USER	EQUIPMENT	INSTALLATION	TANK TYPE	CONTAINMENT	FUEL	CAPACITY (gallons)
145	Base Comm Center	Generator	Inside Building	Steel	Double Wall	Diesel	480
152	Water Pump Station	Generator	Inside Building	Steel	Metal Catch Basin	Diesel	275
160	Alt. Command Post	Generator	Inside Building	Steel	??	Diesel	275
200	Power Production	Generator	Above Ground	Steel	Concrete Catch Basin	Diesel	125
219	Wing Trainer Section	Generators	Above Ground	Steel	No Containment	Diesel	212
219	Wing 6 - T19 Trainers	Generator	Inside Building	Steel	No Containment	Diesel	98
219	Wing 1 - T22 Trainers	Generator	Inside Building	Steel	No Containment	Diesel	94
249	Alert Facility	Generator	On Equipment	Steel	Double Wall	Diesel	150
295	Law Enforcement Desk	Generator	Below Ground			Diesel	600
295	Law Enforcement Desk	Generator	On Equipment	Steel		Diesel	10
349	Fire Department	Generator	On Equipment	Steel	Double Wall	Diesel	300
407	CE Complex	Generator	On Equipment	Steel	Double Wall	Diesel	150
429	Base Gas Station	Generator	Under Equipment	Steel	SW ??, No Catchment	Diesel	75
496	CE Control	Generator	Inside Building	Steel	Double Wall	Diesel	75
500	Command Post	Generator	Inside Building	Steel	?	Diesel	335
500	Command Post	Generator	Above Ground	Steel	Concrete Catch Basin	Diesel	10,000
530	Telephone Switch	Generator	On Equipment	Steel	Metal Catch Basin	Diesel	135
769	Weather Operations	Generator	Above Ground	Steel	SCAT	Diesel	270
910	Base Radio Ant.	Generator	Under Equipment	Steel	No Catch Basin	Diesel	75
1082	Base Telephone Switch	Generator	Below Ground			Diesel	1,000
1082	Base Telephone Switch	Generator	On Equipment	Steel		Diesel	25
1320	Commissary	Generator	Inside Building	Steel	Metal Catch Basin	Diesel	25
1408	Airfield Lighting	Generator	Inside Building	Steel	Metal Catch Basin	Diesel	275
1439	Job Control	Generator	On Equipment	Steel	Double Wall	Diesel	192
1439	Waste Oil	Waste Oil		Steel	Containment Dike 894 Gal.	Waste Oil	745
1440	Three-Bay Hangar	Generator	Below Ground			Diesel	750
1440	Three-Bay Hangar	Generator	On Equipment	Steel	Steel, Double Wall?	Diesel	50
1459	Fire Pump #1	Generator	Inside Building	Steel	Concrete Catch Basin	Diesel	300
1459	Fire Pump #2	Generator	Inside Building	Steel	Concrete Catch Basin	Diesel	300
1459	Fire Pump #3	Generator	Inside Building	Steel	Concrete Catch Basin	Diesel	300

SW = Single Wall
WO = Work Order

7/31/00

UNDERGROUND STORAGE TANK INVENTORY
(MARCH 2000)

BLDG/SITE NO.	STATUS	WORK TO BE DONE	MAT. USED	C.P. USED	YEAR INSTALLED	CAPACITY (GALLONS)	MONTANA TANK NO.	TANK USE
(MAFB)								
200		98	FRP	Y	86 (UPG 93)	500	07-10725-1	WOS
295		98	DFRP	Y	93	600	07-10726-1	EG
320		98	DFRP	Y	93	600	07-10727-2	WOS
685		98	FRP	N	74 (UPG 93)	10,000	07-09277-1	MF
685		98	FRP	N	75 (UPG 93)	10,000	07-09277-2	MF
685		98	FRP	N	76 (UPG 93)	10,000	07-09277-3	MF
685		98	FRP	N	77 (UPG 93)	10,000	07-09277-4	MF
685		98	DFRP	Y	93	600	07-09277-6	WOS
870		98	DWS	Y	88 (Upg 96)	5,000	07-10728-1	WOS
1082		98	DFRP	N	96	1,000	07-08957-2	EG
1440		98	DFRP	Y	93	750	07-07044-1	EG
1450		98	DFRP	N	89 (Upg 96)	550	07-10731-1	WOS
1464		98	DFRP	N	89 (Upg 96)	550	07-10732-1	WOS
1480		98	DFRP	Y	96	4,000	07-10733-2	AR
1831		98	DFRP	N	93	6,000	07-09866-2	EG
1832		98	FRP	N	80(UPG 93)	4,000	07-09867-1	MF
1845 **		98	DFRP		93	3,000	07-09868-2	H
2040		98	DFRP	N	89 (Upg 96)	8,000	07-11290-1	EG
2040		98	DFRP	N	89 (Upg 96)	550	07-11290-2	WOS
2040		98	DFRP	N	95	600	07-11290-4	WOS
3081	-Temp Closed-2/24/00	98	DFRP	N	93	600	07-08970-2	WOS
This is a large aboveground tank								
41101	diesel	98	S	N	54	476881	07-08973-S1	DF
These are Aboveground Storage Tanks with piping that runs underground.								
1408		98	SCAT	N	93 (Upg 96)	2,000	07-08960-2	EG
1879		98	SCAT	N	93 (Upg 96)	2,000	07-08966-1	H/EG
82110		98	SCAT	N	93 (Upg 96)	5,000	07-08942-S2	EG
500 **		98	AST	N	88 (Upg 96)	10,000	07-13718-S1	EG

DEFINITION OF TERMS

TYPES OF TANKS

AR - AIRCRAFT REFUELING TANKS
DE - AIRCRAFT DEICING FLUID TANKS
EG - EMERGENCY GENERATOR TANKS
H - HEATING OIL TANKS
H/EG - HEATING OIL/EMERGENCY GENERATOR TANKS
MF- MOTOR FUEL TANKS
WA - WASTE ACID TANK
WOS - WASTE OIL STORAGE TANKS

UNDERGROUND STORAGE TANK INVENTORY
(MARCH 2000)

Status of Tanks

ABDN - Abandoned
GONE - Tank Has Been Removed
O of S - Tank Is Out of Service
** - Tanks excluded from Yearly Registration will be bolded and shaded.

Material Used

DFRP - Double Walled Fiberglass Reinforced Plastic
FRP - Fiberglass Reinforced Plastic
SCAT - Self Contained Aboveground Tank
AST - Aboveground Storage Tank
S - Steel

TANKS REGISTERED WITH THE STATE OF MONTANA ---------- **245**

MISSILE FIELD	224
ON BASE	20
TOTAL	**244**

TANKS EXCLUDED FROM REGISTRATION ---------- **6**

MISSILE FIELD	5
ON BASE	1
TOTAL	**6**

TOTAL TANKS REGISTERED AND EXCLUDED ---------- **250**

TANKS IN COMPLIANCE WITH 1998 REQUIREMENTS ---------- **250**

MISSILE FIELD	229
ON BASE	21
TOTAL	**250**

TANKS NOT IN COMPLIANCE WITH 1998 REQUIREMENTS ---------- **0**

MISSILE FIELD	0
ON BASE	0
TOTAL	**0**

TOTAL TANKS IN AND OUT OF COMPLIANCE ---------- **250**

Fixed Roof Tanks

ORIGINAL

Tank Type	Building Location	Capacity(gal)	Contents	1997 Throughput(gal)	Shell Length or Height(ft)	Diameter(ft)	Liquid Height(ft) Max	Liquid Height(ft) Avg	Heated (y/n)	Shell condition good/poor	Shell color (see codes)	Roof color (see codes)	Roof condition good/poor	Roof type cone/dome	Roof height	Roof radius (dome only)	Roof slope (cone only)	Breather Vent Setting vacuum	Breather Vent Setting pressure
Vertical Fixed	23	8,000	Diesel																
Vertical Fixed	416	275	Diesel																
Vertical Fixed	664	550	Diesel																
Vertical Fixed	1370	10	Diesel																
Vertical Fixed	348	200	Diesel																
Vertical Fixed	891B	15,000	Gasoline																
Vertical Fixed	747	55	JP-8																
Vertical Fixed	262A	6,000	Diesel																
Vertical Fixed	355	500	Diesel																
Vertical Fixed	1069	250	Gasoline																
Vertical Fixed	1069	250	Diesel																
Vertical Fixed	1362	525	Diesel																
Vertical Fixed	1362	275	Diesel																
Vertical Fixed	889	5,000	JP-8																
Vertical Fixed	140	500	Diesel																
Vertical Fixed	945	100	Diesel																
Vertical Fixed	607	2,000	Gasoline																
Vertical Fixed	889	2,500	JP-8																
Vertical Fixed	888	2,500	JP-8																
Vertical Fixed	888	2,500	JP-8																
Vertical Fixed	1791	500	Diesel																
Vertical Fixed	335	12,000	Diesel																
Vertical Fixed	375	275	Diesel																
Vertical Fixed	1362	2,300	Diesel																
Vertical Fixed	1301	500	Diesel																
Vertical Fixed	1389	275	Diesel																
Vertical Fixed	1380	275	Diesel																
Vertical Fixed	1385	275	Diesel																
Vertical Fixed	1371	1,000	Diesel																
Vertical Fixed	1086	275	Diesel																
Vertical Fixed	656	250	Diesel																
Vertical Fixed	251	250	Diesel																
Vertical Fixed	56	275	Diesel																
Vertical Fixed	375	275	Diesel																
Vertical Fixed	380	100	Diesel																
Vertical Fixed	1795	275	Diesel																
Vertical Fixed	80	250	Diesel																
Vertical Fixed	2099	275	Diesel																
Vertical Fixed	891	500	Residual No.6																
Vertical Fixed	21	250	Diesel																
Vertical Fixed	623	70	Diesel																
Vertical Fixed	706	275	Diesel																
Vertical Fixed	740	100	Diesel																
Vertical Fixed	748	200	Diesel																
Vertical Fixed	768	3,000	Diesel																
Vertical Fixed	342	25	Diesel																
Vertical Fixed	1365	100	Diesel																
Vertical Fixed	1053	500	Diesel																
Vertical Fixed	272	250	Diesel																
Vertical Fixed	30	1,000	Residual No.6																
Vertical Fixed	30	500	Residual No.6																
Vertical Fixed	52	1,000	Diesel																
Vertical Fixed	60	1,000	Diesel																
Vertical Fixed	253	1,000	Diesel																
Vertical Fixed	272	2,000	Diesel																
Vertical Fixed	340	500	Residual No.6																

*ORIGINAL

Fixed Roof Tanks

Tank Type	Building Location	Capacity(gal)	Contents	1999 Throughput(gal)	Shell Length or Height(ft)	Diameter(ft)	Liquid Height(ft)		Heated (y/n)	Shell condition good/poor	Shell color (see codes)	Roof color (see codes)	Roof condition good/poor	Roof type cone/dome	Roof height	Roof radius (dome only)	Roof slope (cone only)	Breather Vent Setting	
							Max	Avg										vacuum	pressure
UST (Horizontal Fixed)	1447	10,000	JP-8																
Vertical Fixed	191	600	DL-2																
Vertical Fixed	1309	1,000	DL-2																
Vertical Fixed	1807	750	DL-2																
Vertical Fixed	1869	6,000	DL-2																
Vertical Fixed	1879, #1	3,000	DL-2																
Vertical Fixed	1880	2,000	DL-2																
Vertical Fixed	1882	8,000	DL-2																
Vertical Fixed	1887	10,000	DL-2																
Vertical Fixed	41101	475,000	DL-1																
Vertical Fixed	248	500	DL-1																
Vertical Fixed	349	270	DL-1																
Vertical Fixed	1408	2,000	DL-1																
Vertical Fixed	1879, #3	2,000	DL-1																
Vertical Fixed	82110	5,000	DL-1																
Vertical Fixed	500	10,000	DL-1																
Vertical Fixed	450, #4	10,000	DL-1																
Vertical Fixed	295	600	DL-1																
Vertical Fixed	1082	1,000	DL-1																
Vertical Fixed	1440	750	DL-1																
Vertical Fixed	1831	6,000	DL-1																
Vertical Fixed	2040	8,000	DL-1																
Vertical Fixed	1447, #2	10,000	DL-1																
Vertical Fixed	1091, #1	10,000	DL-1																
Vertical Fixed	1845	3,000	DL-1																
Vertical Fixed	1879, #2	2,000	DL-1																

Use the following codes for each tank
Paint color: white/white (W), aluminum/diffuse (A), aluminum/specular (S), gray/light (G), gray/medium (M), red/primer (R)
Roof color: white/white (W), aluminum/diffuse (A), aluminum/specular (S), gray/light (G), gray/medium (M), red/primer (R)

Floating Roof Tanks

ORIGINAL

Tank Type	Building Number	Tank Number	Capacity(gal)	Contents	Diameter(ft)	1999 Throughput(gal)	Shell condition (see codes)	Paint Color (see codes)	Paint condition good/poor	Roof type pontoon/deck	Tank Construction (welded/riveted)	Primary Rim Seal (see codes)	Secondary Seal (see codes)
Internal Floating Roof	41100	S-1	1,050,000	JP-8									
Internal Floating Roof	41102	S-2	1,050,000	JP-8									
Internal Floating Roof	41120	H-1	200,000	JP-8									
Internal Floating Roof	41120	H-2	200,000	JP-8									

Use the following codes for each tank
Shell conditions: light rust (L), dense rust (D), or grunite linig (G)
Paint color: white/white (W), aluminum/diffuse (A), gray/light (G), gray/medium (M), red/primer (R)
Primary Rim Seal: liquid-mounted (L), mechanical shoe (M), vapor mounted (V)
Secondary Seal: none (N), rim-mounted (R), shoe-mounted (S)

TANKS 4.0
Emissions Report - Summary Format
Tank Identification and Physical Characteristics

Identification

User Identification:	H-2
City:	Great Falls
State:	Montana
Company:	Malmstrom
Type of Tank:	Internal Floating Roof Tank
Description:	JP-8 IFR Tank 41121

Tank Dimensions

Diameter (ft):	31.00
Volume (gallons):	200,000.00
Turnovers:	0.35
Self Supp. Roof? (y/n):	Y
No. of Columns:	0.00
Eff. Col. Diam. (ft):	0.00

Paint Characteristics

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition:	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Rim-Seal System

Primary Seal:	Mechanical Shoe
Secondary Seal:	Rim-mounted

Deck Characteristics

Deck Fitting Category:	Typical
Deck Type:	Welded

Deck Fitting/Status	Quantity
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1
Automatic Gauge Float Well/Unbolted Cover, Ungasketed	1
Roof Leg or Hanger Well/Adjustable	10
Sample Pipe or Well (24-in. Diam.)/Slit Fabric Seal 10% Open	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1

Meteorological Data used in Emissions Calculations: Great Falls, Montana (Avg Atmospheric Pressure = 12.88 psia)

TANKS 4.0
Emissions Report - Summary Format
Liquid Contents of Storage Tank

Mixture/Component	Month	Daily Liquid Surf. Temperatures (deg F) Avg.	Min.	Max.	Liquid Bulk Temp. (deg F)	Vapor Pressures (psia) Avg.	Min.	Max.	Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Jet kerosene	All	46.46	40.74	52.17	44.77	0.0052	N/A	N/A	130.0000			162.00	Option 5: A=12.39, B=8933

TANKS 4.0
Emissions Report - Summary Format
Individual Tank Emission Totals

Annual Emissions Report

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawal Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Jet kerosene	0.24	0.53	1.93	0.00	2.70

TANKS 4.0
Emissions Report - Summary Format
Tank Identification and Physical Characteristics

Identification

User Identification:	H-1
City:	Great Falls
State:	Montana
Company:	Malmstrom
Type of Tank:	Internal Floating Roof Tank
Description:	JP-8 Storage tank (41120)

Tank Dimensions

Diameter (ft):	31.00
Volume (gallons):	200,000.00
Turnovers:	0.35
Self Supp. Roof? (y/n):	N
No. of Columns:	1.00
Eff. Col. Diam. (ft):	1.00

Paint Characteristics

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition:	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Rim-Seal System

Primary Seal:	Mechanical Shoe
Secondary Seal:	Rim-mounted

Deck Characteristics

Deck Fitting Category:	Typical
Deck Type:	Welded

Deck Fitting/Status	Quantity
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1
Automatic Gauge Float Well/Unbolted Cover, Ungasketed	1
Column Well (24-in. Diam.)/Built-Up Col.-Sliding Cover, Ungask.	1
Ladder Well (36-in. Diam.)/Sliding Cover, Ungasketed	1
Roof Leg or Hanger Well/Adjustable	10
Sample Pipe or Well (24-in. Diam.)/Slit Fabric Seal 10% Open	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1

Meteorological Data used in Emissions Calculations: Great Falls, Montana (Avg Atmospheric Pressure = 12.88 psia)

TANKS 4.0
Emissions Report - Summary Format
Liquid Contents of Storage Tank

		Daily Liquid Surf. Temperatures (deg F)			Liquid Bulk Temp.	Vapor Pressures (psia)			Vapor	Liquid	Vapor		
Mixture/Component	Month	Avg.	Min.	Max.	(deg F)	Avg.	Min.	Max.	Mol. Weight	Mass Fract.	Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Jet kerosene	All	46.46	40.74	52.17	44.77	0.0052	N/A	N/A	130.0000			162.00	Option 5: A=12.39, B=8933

TANKS 4.0
Emissions Report - Summary Format
Individual Tank Emission Totals

Annual Emissions Report

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawal Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Jet kerosene	0.24	0.54	3.54	0.00	4.33

TANKS 4.0
Emissions Report - Summary Format
Tank Identification and Physical Characteristics

Identification

User Identification:	B430 gas
City:	Great Falls
State:	Montana
Company:	Malmstrom
Type of Tank:	Vertical Fixed Roof Tank
Description:	10,000 gal AST B430 gasoline

Tank Dimensions

Shell Height (ft):	15.00
Diameter (ft):	11.00
Liquid Height (ft):	14.00
Avg. Liquid Height (ft):	8.00
Volume (gallons):	10,000.00
Turnovers:	14.99
Net Throughput (gal/yr):	149,897.00
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition:	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Roof Characteristics

Type:	Dome
Height (ft):	3.00
Radius (ft) (Dome Roof):	11.00

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig):	0.03

Meteorological Data used in Emissions Calculations: Great Falls, Montana (Avg Atmospheric Pressure = 12.88 psia)

TANKS 4.0
Emissions Report - Summary Format
Liquid Contents of Storage Tank

Mixture/Component	Month	Daily Liquid Surf. Temperatures (deg F) Avg.	Min.	Max.	Liquid Bulk Temp. (deg F)	Vapor Pressures (psia) Avg.	Min.	Max.	Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Gasoline (RVP 10)	All	46.46	40.74	52.17	44.77	3.9599	3.5185	4.4449	66.0000			92.00	Option 4: RVP=10, ASTM Slope=3

TANKS 4.0
Emissions Report - Summary Format
Individual Tank Emission Totals

Annual Emissions Report

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Gasoline (RVP 10)	932.76	729.99	1,662.75

TANKS 4.0
Emissions Report - Summary Format
Tank Identification and Physical Characteristics

Identification

User Identification:	1890gas
City:	Great Falls
State:	Montana
Company:	Malmstrom
Type of Tank:	Horizontal Tank
Description:	100 gallon AST for gasoline - 1890

Tank Dimensions

Shell Length (ft):	5.00
Diameter (ft):	3.00
Volume (gallons):	100.00
Turnovers:	12.00
Net Throughput (gal/yr):	1,200.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition:	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig):	0.03

Meteorological Data used in Emissions Calculations: Great Falls, Montana (Avg Atmospheric Pressure = 12.88 psia)

TANKS 4.0
Emissions Report - Summary Format
Liquid Contents of Storage Tank

Mixture/Component	Month	Daily Liquid Surf. Temperatures (deg F)			Liquid Bulk Temp. (deg F)	Vapor Pressures (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Gasoline (RVP 10)	All	46.46	40.74	52.17	44.77	3.9599	3.5185	4.4449	66.0000			92.00	Option 4: RVP=10, ASTM Slope=3

TANKS 4.0
Emissions Report - Summary Format
Individual Tank Emission Totals

Annual Emissions Report

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Gasoline (RVP 10)	7.47	42.81	50.28

TANKS 4.0
Emissions Report - Summary Format
Tank Identification and Physical Characteristics

Identification	
User Identification:	1831Gas
City:	Great Falls
State:	Montana
Company:	Malmstrom
Type of Tank:	Horizontal Tank
Description:	Fixed roof AST for gasoline storage - 1831
Tank Dimensions	
Shell Length (ft):	5.00
Diameter (ft):	4.00
Volume (gallons):	500.00
Turnovers:	12.00
Net Throughput (gal/yr):	6,000.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N
Paint Characteristics	
Shell Color/Shade:	White/White
Shell Condition:	Good
Breather Vent Settings	
Vacuum Settings (psig):	-0.03
Pressure Settings (psig):	0.03

Meteorological Data used in Emissions Calculations: Great Falls, Montana (Avg Atmospheric Pressure = 12.88 psia)

TANKS 4.0
Emissions Report - Summary Format
Liquid Contents of Storage Tank

Mixture/Component	Month	Daily Liquid Surf. Temperatures (deg F) Avg.	Min.	Max.	Liquid Bulk Temp. (deg F)	Vapor Pressures (psia) Avg.	Min.	Max.	Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Gasoline (RVP 10)	All	46.46	40.74	52.17	44.77	3.9599	3.5185	4.4449	66.0000			92.00	Option 4: RVP=10, ASTM Slope=3

TANKS 4.0
Emissions Report - Summary Format
Individual Tank Emission Totals

Annual Emissions Report

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Gasoline (RVP 10)	37.34	70.48	107.81

TANKS 4.0
Emissions Report - Summary Format
Tank Identification and Physical Characteristics

Identification

User Identification:	1470Gas
City:	Great Falls
State:	Montana
Company:	Malmstrom
Type of Tank:	Vertical Fixed Roof Tank
Description:	Gasoline Fueling Tank for Redhorse

Tank Dimensions

Shell Height (ft):	5.00
Diameter (ft):	6.00
Liquid Height (ft):	4.73
Avg. Liquid Height (ft):	3.00
Volume (gallons):	1,000.00
Turnovers:	12.00
Net Throughput (gal/yr):	12,000.00
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition:	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Roof Characteristics

Type:	Dome
Height (ft):	1.00
Radius (ft) (Dome Roof):	0.00

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig):	0.03

Meteorological Data used in Emissions Calculations: Great Falls, Montana (Avg Atmospheric Pressure = 12.88 psia)

TANKS 4.0
Emissions Report - Summary Format
Liquid Contents of Storage Tank

Mixture/Component	Month	Daily Liquid Surf. Temperatures (deg F)			Liquid Bulk Temp. (deg F)	Vapor Pressures (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Gasoline (RVP 10)	All	46.46	40.74	52.17	44.77	3.9599	3.5185	4.4449	66.0000			92.00	Option 4: RVP=10, ASTM Slope=3

TANKS 4.0
Emissions Report - Summary Format
Individual Tank Emission Totals

Annual Emissions Report

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Gasoline (RVP 10)	74.67	116.48	191.15

RAW DATA

SECTION 11 – FUEL TRANSFER

L1.AND.SEQUENCE=BLD. 430.AND.DATE>=19990101.AND.DATE<=19991231 .AND. !deleted = 7 Total = 72,745 Optimization Level - Full

DATE	GRADE	ISS PT	SERIAL	QUANTIT	MDS	TAIL NUMBER	CIC	BUYERS DODA	NON FLY ORG	TID
01/12/1999	DL1		0	7102				FP4626		
01/21/1999	DL1		0	7094				FP4626		
01/29/1999	DL1		0	6083				FP4626		
02/08/1999	DL1		0	5066				FP4626		
02/12/1999	DL1		0	5073				FP4626		
02/23/1999	DL1		0	7068				FP4626		
03/17/1999	DL1		0	6076				FP4626		
				43562						

Ball valves 4 (2 closed) pump isolation
Non-surge Check valves (1 per pump) total 2
offload 2 @ each pump (3 total sample connections)

Diesel & MUR

- 2 tanks @ gas station (10000 gal. 11-wall AST)
(10000 gallon tanker)
- tanker truck pumps to station tanks

offload 508 Pm pump (not used) Stripper pumps for hoses

3 Ball valves → +
Ck valve for fill
1 " " @ Dispenser

- MUR no Sample Conn.
- Diesel (1) sample connection

Count: 7

-ENCE=BLD. 430.AND.DATE>=19990101.AND.DATE<=19991231 .AND. !deleted = 18 Total = 72,745 Optimization Level - Full

	GRADE	ISS PT	SERIAL	QUANTIT	MDS	TAIL NUMBER	CIC	BUYERS DODA	NON FLY ORG	TID
03/26/1999	DL2		0	8020				FP4626		
04/01/1999	DL2		0	6043				FP4626		
04/12/1999	DL2		0	6038				FP4626		
04/20/1999	DL2		0	5994				FP4626		
04/28/1999	DL2		0	5025				FP4626		
05/06/1999	DL2		0	5028				FP4626		
05/24/1999	DL2		0	6960				FP4626		
06/01/1999	DL2		0	5982				FP4626		
06/10/1999	DL2		0	5001				FP4626		
06/17/1999	DL2		0	5958				FP4626		
06/24/1999	DL2		0	4965				FP4626		
07/01/1999	DL2		0	4994				FP4626		
07/10/1999	DL2		0	4994				FP4626		
07/20/1999	DL2		0	4969				FP4626		
07/28/1999	DL2		0	3931				FP4626		
08/10/1999	DL2		0	5938				FP4626		
08/18/1999	DL2		0	5979				FP4626		
08/26/1999	DL2		0	4973				FP4626		
				100792						

Count: 18

69d70

)1/1999 TO -12/31/1999

SQUADRON BY ACTIVITY/TEC/GRADE

GRADE	ACTIVITY			TEC	BUNO	DATE	QUANTITY	COST
JP8					69006611	08/31/1999	130.000	$ 80.87
Total Activity		JP8SALE	(1035)				138398.000	$ 86,097.40
							138398.000	$ 86,097.40

2-12-6-18 31

L1.AND.SEQUENCE=BLD.1710.AND.DATE>=19990101.AND.DATE<=19991231 .AND. !deleted = 3 Total = 72,745 Optimization Level - Full

DATE	GRADE	ISS PT	SERIAL	QUANTIT	MDS	TAIL NUMBER	CIC	BUYERS DODA	NON FLY ORG	TID
06/15/1999	DL1		0	19928				FP4626		
06/18/1999	DL1		0	29848				FP4626		
06/24/1999	DL1		0	9948				FP4626		
				59724						

tank D1 (450,000 gallon)
keep ≈ 100,000 gallons

tank D1 transfer

→ tanker truck
→ tank → Bottom load (1200 gal)
→ - missile complex tanks
- Red horse heavy Equipment
- generators
- heat tanks

"gasoline style pump" @ 45 gpm

Count: 3

RAW DATA

SECTION 12 – GASOLINE SERVICE STATIONS

Gasoline Service Stations

BX GAS STATION

Gasoline Throughput in 1999	Underground Storage Tank Fill Method (submerged, splash, balanced submerged) - I.e. Type I Vapor Recovery	Stage II Vapor Recovery Present? (automobile refueling)
672,592	type 1 vapor recovery	yes

GASOLINE → 10,000 gal. tank @ Military Service Station

UR.AND.SEQUENCE=BLD. 430.AND.DATE>=19990101.AND.DATE<=19991231 .AND. !deleted = 27 Total = 72,745 Optimization Level - Full

DATE	GRADE	ISS PT	SERIAL	QUANTIT	MDS	TAIL NUMBER	CIC	BUYERS DODA	NON FLY ORG	TID
01/06/1999	MUR		0	6129				FP4626		
01/15/1999	MUR		0	6098				FP4626		
01/21/1999	MUR		0	5103				FP4626		
01/29/1999	MUR		0	5105				FP4626		
02/08/1999	MUR		0	5087				FP4626		
02/12/1999	MUR		0	5106				FP4626		
02/25/1999	MUR		0	6058				FP4626		
03/04/1999	MUR		0	7116				FP4626		
03/17/1999	MUR		0	7084				FP4626		
03/26/1999	MUR		0	6024				FP4626		
04/01/1999	MUR		0	5068				FP4626		
04/12/1999	MUR		0	5047				FP4626		
04/15/1999	MUR		0	6062				FP4626		
04/20/1999	MUR		0	5017				FP4626		
04/28/1999	MUR		0	6039				FP4626		
05/06/1999	MUR		0	6052				FP4626		
05/24/1999	MUR		0	4987				FP4626		
06/01/1999	MUR		0	4996				FP4626		
06/10/1999	MUR		0	6011				FP4626		
06/17/1999	MUR		0	4960				FP4626		
06/24/1999	MUR		0	4943				FP4626		
07/01/1999	MUR		0	4990				FP4626		
07/09/1999	MUR		0	4990				FP4626		
07/20/1999	MUR		0	4954				FP4626		
07/28/1999	MUR		0	5953				FP4626		
08/18/1999	MUR		0	4968				FP4626		
08/26/1999	MUR		0	5950				FP4626		
				149897						

Count: 27

Gasoline Service Stations

Mike
MR. FORAN
X 4320

Gasoline Throughput in 1999	Underground Storage Tank Fill Method (submerged, splash, balanced submerged) - I.e. Type I Vapor Recovery	Stage II Vapor Recovery Present? (automobile refueling)
149897	ABOVE GROUND 10,000 GL (GASOLINE)	NO ?
~~143000~~	~~ABOVE GROUND 10,000 GL (DIESEL)~~ (N/A)	NO ?

RAW DATA

SECTION 13 – HEAVY CONSTRUCTRION OPERATIONS

Red Horse

Heavy Construction Operations

RH

Construction Location	Number of working days (8-hr equivalent) construction activities completed	Area (acres, square ft, etc) of *daily* construction activity
Water Line, Perimeter Road	30	7920 sq ft
Field Training Area	10	400 sq ft

RAW DATA

SECTION 14 – LANDFARM OPERATIONS

Chemdat 8 model Output
Diesel Contaminated Soil

COMPOUND NAME		
Ver 2.0 press {ALT} M	L,Loading (g oil/cc soil)	0.0006
	Concentration in oil(ppmw)	1.00E+06
	l,Depth of tilling (cm)	20
	Total porosity	0.61
	Air Porosity(0 if unknown)	0
	MW oil	185
	For aqueous waste, enter 1	0
BENZENE	Time of calc. (days)	365.25
ACETIC ACID	For biodegradation,enter 1	1
ACETONE	Temperature (Deg. C)	25
ACRYLIC ACID	Wind Speed (m/s)	5.5
ACRYLONITRILE	Area (m2)	6677
ANILINE	TOTAL EMISSIONS Mg/m2-yr	1.20E-04
BUTANOL-1	Dei/Dai	0.517421738

Chem Dat 8 model output
Gasoline contaminated soil.

COMPOUND NAME

	LAND TREATMENT MODEL DATA	
press {CTRL} M FOR MENU	(land treatment)	
Ver 2.0 press {ALT} M	L,Loading (g oil/cc soil)	0.0018
	Concentration in oil(ppmw)	1.00E+06
	l,Depth of tilling (cm)	20
	Total porosity	0.61
	Air Porosity(0 if unknown)	0
	MW oil	94
	For aqueous waste, enter 1	0
BENZENE	Time of calc. (days)	365.25
ACETIC ACID	For biodegradation,enter 1	1
ACETONE	Temperature (Deg. C)	25
ACRYLIC ACID	Wind Speed (m/s)	5.5
ACRYLONITRILE	Area (m2)	6677
ANILINE	TOTAL EMISSIONS Mg/m2-yr	3.57E-04
BUTANOL-1	Dei/Dai	0.517421738

Aug-07-00 12:57P CES/CEVR 406 731-6181 P.02

1

(1)

MIDCONTINENT TESTING LABORATORIES INC.

2381 South Plaza Drive • P.O. Box 3388 • Rapid City, SD 57709
605/348-0111

PROJECT: C0731
DESCRIPTION: BLDG 1091 DEMO

JOE ALINE
SHUMAKER TRUCKING
P.O. BOX 1442
GREAT FALLS, MT 59403

ACCOUNT NUMBER: W1051
DATE RECEIVED: 02/03/98
TIME RECEIVED: 09:30 AM
REPORT DATE: 02/19/98

SAMPLE MATRIX: SOIL
TEST METHOD: DRO
REPORTED UNITS: mg/KG

Set#3

NUMBER	SAMPLE SITE	DATE	TIME	TPH WASTE OIL	TPH DIESEL	TPH GAS	MTBE	BENZENE	TOLUENE	ETHYL BENZENE	XYLENES	LEAD(ppm)
0209501	TANK#3 STOCKPIL	02/05/98	13:30	.	690.	.	.	.	.	.	.	.
0209502	TANK#3 IN EXC.	02/05/98	13:35	.	1600.	.	.	.	.	.	.	.
0209501	LAB SOIL	/ /		.	<10.	.	.	.	.	.	.	.
0209502D	TANK#3 IN EXC.	02/05/98	13:35	.	2200.	.	.	.	.	.	.	.

COMMENTS

The TPH/Diesel values reported above are for Total Extractable Hydrocarbons quantitated by a DRO calibration curve.

SAMPLE ID:19980209-	501	502
DRO	640.	1600.
DRO AS DIESEL	640.	1600.

APPROVED BY: [signature]

DATE: 02/19/98 - Reprint

Sampling Date corrected on - 501

SET #4 4

MIDCONTINENT
TESTING LABORATORIES

2381 South Plaza Drive • P.O. Box 3388 • Rapid City, SD 57709
605/348-0111

PROJECT: C0731
DESCRIPTION: SERVICE STATION DEMO

JOE ALINE
SHUMAKER TRUCKING
P.O. BOX 1442
GREAT FALLS, MT 59403

ACCOUNT NUMBER: K1051
DATE RECEIVED: 02/11/98
TIME RECEIVED: 09:30 AM
REPORT DATE: 02/13/98

SAMPLE MATRIX: SOIL
TEST METHOD: DRO
REPORTED UNITS: mg/KG

Set# 4

AB NUMBER	SAMPLE SITE	DATE	TIME	TPH WASTE OIL	TPH DIESEL	TPH GAS	MTBE	BENZENE	TOLUENE	ETHYL BENZENE	XYLENES	LEAD(ppm)
9980211507	TANK#3 EXCAVAT.	02/09/98	10:00	.	5100.	.	.	.	.	.	.	.
9980211508	TANK#3 EXCAVAT.	02/09/98	10:10	.	5900.	.	.	.	.	.	.	.
9980211509	TANK#3 STOCKPIL	02/09/98	10:20	.	520.	.	.	.	.	.	.	.
9980211510	TANK#3 STOCKPIL	02/09/98	13:45	.	64.	.	.	.	.	.	.	.
9980211511	TANK#3 STOCKPIL	02/09/98	14:00	.	54.	.	.	.	.	.	.	.
9980211607S	LAB SOIL-SPIKE	/ /		.	92.%	.	.	.	.	.	.	.
9980211607	LAB SOIL	/ /		.	<10.	.	.	.	.	.	.	.

RECEIVED FEB 17 1998

COMMENTS

The TPH/Diesel values reported above are for Total Extractable Hydrocarbons quantitated by a DRO calibation curve.

SAMPLE ID:19980211-	507	508	509	510	511
DRO	5000.	5800.	520.	55.	52.
DRO AS DIESEL	5000.	5800.	520.	55.	52.

APPROVED BY:

DATE: 02/13/98

SET #5 5

MIDCONTINENT TESTING LABORATORIES

2301 South Plaza Drive • P.O. Box 3388 • Rapid City, SD 57709
605/348-0111

PROJECT: C0731
DESCRIPTION: SERVICE STATION DEMO

JOE ALINE
SHUMAKER TRUCKING
P.O. BOX 1442
GREAT FALLS, MT 59403

ACCOUNT NUMBER: M1051
DATE RECEIVED: 02/12/98
TIME RECEIVED: 09:20 AM
REPORT DATE: 02/13/98

SAMPLE MATRIX: SOIL
TEST METHOD: DRO
REPORTED UNITS: mg/KG

Set # 5

LAB NUMBER	SAMPLE SITE	DATE	TIME	TPH WASTE OIL	TPH DIESEL	TPH GAS	MTBE	BENZENE	TOLUENE	ETHYL BENZENE	XYLENES	LEAD(ppm)
19980212517	TANK#3 EXCAVAT.	02/10/98	12:30	.	1000.	.	.	.	.	.	.	.
19980212518	TANK#3 PIPING	02/10/98	13:10	.	750.	.	.	.	.	.	.	.
19980212519	TANK#3 STOCKPIL	02/10/98	13:25	.	74.	.	.	.	.	.	.	.
19980212520	TANK#3 DISPENSE	02/10/98	13:45	.	770.	.	.	.	.	.	.	.
19980212521	TANK#3 STOCKPIL	02/10/98	14:05	.	780.	.	.	.	.	.	.	.
19980212522	TANK#3 EXCAVAT.	02/10/98	15:00	.	1000.	.	.	.	.	.	.	.
19980212617	LAB SOIL	/ /		.	<10.	.	.	.	.	.	.	.
19980212617S	LAB SOIL-SPIKE	/ /		.	87.%	.	.	.	.	.	.	.

RECEIVED FEB 17 1998

COMMENTS

The TPH/Values reported above are Total Extractable hydrocarbons quantified by a DRO calibration curve.

SAMPLE ID: 19980212-	517	518	519	520	521	522
DRO	970.	740.	72.	750.	770.	1000.
DRO AS DIESEL	970.	740.	72.	750.	770.	1000.

APPROVED BY: [signature]

DATE: 02/13/98

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MIDCONTINENT
TESTING LABORATORIES

2381 South Plaza Drive • P.O. Box 3388 • Rapid City, SD 57709
605/348-0111

PROJECT: C0731
DESCRIPTION: SERV. STA. DEMO

JOE ALINE
SHUMAKER TRUCKING
P.O. BOX 1442
GREAT FALLS, MT 59403

SET #6

ACCOUNT NUMBER: W1051
DATE RECEIVED: 02/17/98
TIME RECEIVED: 09:20 AM
REPORT DATE: 02/23/98

SAMPLE MATRIX: SOIL
TEST METHOD: GRO 8020
REPORTED UNITS: mg/KG

LAB NUMBER	SAMPLE SITE	DATE	TIME	TPH WASTE OIL	TPH DIESEL	TPH GAS	MTBE	BENZENE	TOLUENE	ETHYL BENZENE	XYLENES	LEAD(ppm)
19980217509	TANK 2 EXC 0900	02/11/98	09:00 AM	.	.	22.	<0.20	<0.20	<0.20	<0.20	<0.20	.
9980217510	TANK 2 EXC 1100	02/11/98	11:00 AM	.	.	320.	<0.20	<0.20	0.33	1.6	15.	.
9980217511	TANK 2 EXC 1300	02/11/98	13:00 PM	.	.	220.	<0.20	<0.20	0.25	1.4	7.9	.
9980217512	TANK 2 EXC 1500	02/11/98	15:00 PM	.	.	42.	<0.20	<0.20	0.23	0.23	1.1	.
9980217609	LAB SOIL	/ /		.	.	<10.	<0.20	<0.20	<0.20	<0.20	<0.20	.
9980217609S	LAB SOIL-SPIKE	/ /		.	.	89.%	89.%	80.%	84.%	87.%	87.%	.

COMMENTS

The TPH/GAS values reported above are total extractable hydrocarbons quantitated by a gasoline calibration curve.

SAMPLE ID:19980217-	509	510	511	512
GRO	11.	160.	88.	19.
GRO AS GASOLINE	11.	160.	88.	19.

The chromatographic profile indicates the presence of weathered gasoline.

APPROVED BY: [signature]

DATE: 02/23/98

7

MIDCONTINENT TESTING LABORATORIES

2381 South Plaza Drive • P.O. Box 3388 • Rapid City, SD 57709
605/348-0111

PROJECT: C0731
DESCRIPTION: SERV. STA. DEMO

ACCOUNT NUMBER: M1051
DATE RECEIVED: 02/17/98
TIME RECEIVED: 09:20 AM
REPORT DATE: 02/23/98

JOE ALINE
SHUMAKER TRUCKING
P.O. BOX 1442
GREAT FALLS, MT 59403

Set #7

SAMPLE MATRIX: SOIL
TEST METHOD: GRO 8020
REPORTED UNITS: mg/KG

AB NUMBER	SAMPLE SITE	DATE	TIME	TPH WASTE OIL	TPH DIESEL	TPH GAS	MTBE	BENZENE	TOLUENE	ETHYL BENZENE	XYLENES	LEAD(ppm)
9980217513	TANK 1 EXC 0900	02/12/98	09:00 AM	.	.	22.	<0.20	<0.20	<0.20	<0.20	<0.20	
9980217514	TANK 1 EXC 1130	02/12/98	11:30 AM	.	.	220.	<0.20	<0.20	<0.20	1.3	2.1	.
9980217515	TANK 1 EXC 1345	02/12/98	13:45 PM	.	.	55.	<0.20	<0.20	<0.20	0.36	0.61	.
9980217516	TANK 2 EXC 1600	02/12/98	16:00 PM	.	.	31.	<0.20	<0.20	<0.20	<0.20	<0.20	.

COMMENTS

The TPH/GAS values reported above are total purgeables hydrocarbon quantitated by a gasoline calibration curve.

SAMPLE ID:19980217-	513	514	515	516
GRO	<10.	100.	21.	<10.
GRO AS GASOLINE	<10.	100.	21.	<10.

The chromatographic profile indicated the presence of weathered gasoline.

APPROVED BY: [signature]

DATE: 02/23/98

8

MIDCONTINENT TESTING LABORATORIES

2381 South Plaza Drive • P.O. Box 3388 • Rapid City, SD 57709
605/348-0111

PROJECT: C0731
DESCRIPTION: SERV. STA. DEMO

ACCOUNT NUMBER: W1051
DATE RECEIVED: 02/17/98
TIME RECEIVED: 09:20 AM
REPORT DATE: 02/23/98

JOE ALINE
SHUMAKER TRUCKING
P.O. BOX 1442
GREAT FALLS, MT 59403

SET #9

SAMPLE MATRIX: SOIL
TEST METHOD: GRO 8020
REPORTED UNITS: mg/KG

Set #9

LAB NUMBER	SAMPLE SITE	DATE	TIME	TPH WASTE OIL	TPH DIESEL	TPH GAS	MTBE	BENZENE	TOLUENE	ETHYL BENZENE	XYLENES	LEAD(ppm)
19980217517	TANK 1 EXC A	02/13/98	09:00 AM	.	.	2300.	1.2	0.79	61.	39.	270.	.
9980217518	TANK 1 EXC B	02/13/98	10:15 AM	.	.	280.	0.36	<0.20	1.7	2.4	21.	.
9980217519	TANK 1 EXC C	02/13/98	11:50 AM	.	.	500.	<0.20	0.37	2.5	2.6	29.	.
9980217520	TANK 1 EXC D	02/13/98	15:00 PM	.	.	75.	<0.20	<0.20	<0.20	1.2	4.3	.
9980217521	TANK 1 EXC E	02/13/98	15:45 PM	.	.	37.	<0.20	<0.20	<0.20	0.38	1.1	.

RECEIVED MAR 1 4 1998

COMMENTS

The TPH/GAS values reported above are total purgeable hydrocarbons quantitated by a gasoline calibration curve.

SAMPLE ID:19980217-	517	518	519	520	521
GRO	1500.	170.	240.	40.	22.
GRO AS GASOLINE	1500.	170.	240.	40.	22.

APPROVED BY: [signature]

DATE: 02/23/98

MIDCONTINENT
TESTING LABORATORIES

2381 South Plaza Drive • P.O. Box 3388 • Rapid City, SD 57709
605/348-0111

PROJECT: C0731
DESCRIPTION: SERVICE STATION DEMO

JOE ALINE
SHUMAKER TRUCKING
P.O. BOX 1442
GREAT FALLS, MT 59403

SET #10

ACCOUNT NUMBER: W1051
DATE RECEIVED: 02/20/98
TIME RECEIVED: 09:20 AM
REPORT DATE: 02/27/98

SAMPLE MATRIX: SOIL
TEST METHOD: GRO/8020
REPORTED UNITS: mg/KG

NUMBER	SAMPLE SITE	DATE	TIME	TPH WASTE OIL	TPH DIESEL	TPH GAS	MTBE	BENZENE	TOLUENE	ETHYL BENZENE	XYLENES	LEAD(ppm)
0220508	DISPEN.AREA GAS	02/17/98	09:45 AM	.	.	830.	<0.20	3.1	20.	5.2	30.	.
0220509	GAS DISPEN.AREA	02/17/98	11:32 AM	.	.	380.	<0.20	1.8	11.	4.3	20.	.
0220510	GAS DISPEN.AREA	02/17/98	01:12 PM	.	.	1200.	<1.0	0.46	3.1	18.	15.	.
0220511	GAS DISPEN.AREA	02/17/98	02:06	.	.	420.	<0.20	0.28	2.5	4.4	9.1	.
0220512	GAS DISPEN.AREA	02/17/98	02:20 PM	.	.	220.	<0.20	<0.20	0.38	1.6	2.3	.
0220513	GAS DISPEN.AREA	02/17/98	03:45 PM	.	.	190.	<0.20	<0.20	<0.20	<0.20	0.36	.
0220514	GAS DISPEN.AREA	02/17/98	01:00 PM	.	.	<10.	<0.20	<0.20	<0.20	<0.20	<0.20	.
0220515	GAS DISPEN.AREA	02/17/98	05:01 PM	.	.	<10.	<0.20	<0.20	<0.20	<0.20	<0.20	.
02205110	GAS DISPEN.AREA	02/17/98	02:06	.	.	430.	<0.40	0.24	2.4	4.2	8.7	.
0220514S	GAS DISPEN.AREA	02/17/98	01:00 PM	.	.	80.%	81.%	80.%	84.%	88.%	87.%	.

REC[illegible]

COMMENTS

The TPH/Gas values reported above are total purgeable hydrocarbon quantitated by a Gasoline calibration curve.

SAMPLE ID:19980220-	508	509	510	511	512	513	514	515
GRO	340.	190.	540.	190.	84.	28.	<10.	<10.
GRO AS GASOLINE	340.	190.	540.	190.	84.	28.*	<10.	<10.

APPROVED BY: [signature]

DATE: 02/27/98

3

MIDCONTINENT
TESTING LABORATORIES

SET #4

2381 South Plaza Drive • P.O. Box 3388 • Rapid City, SD 57709
605/348-0111

PROJECT: C0731
DESCRIPTION: SERVICE STATION DEM

JOE ALINE
SHUMAKER TRUCKING
P.O. BOX 1442
GREAT FALLS, MT 59403

ACCOUNT NUMBER: M1051
DATE RECEIVED: 02/11/98
TIME RECEIVED: 09:30 AM
REPORT DATE: 02/13/98

SAMPLE MATRIX: SOIL
TEST METHOD: GRO/MOD.8020
REPORTED UNITS: mg/KG

Set #4

LAB NUMBER	SAMPLE SITE	DATE	TIME	TPH WASTE OIL	TPH DIESEL	TPH GAS	MTBE	BENZENE	TOLUENE	ETHYL BENZENE	XYLENES	LEAD(ppm)
19980211501	TANK#1 STOCKPIL	02/09/98	09:00	.	.	<10.	<0.20	<0.20	<0.20	<0.20	<0.20	.
19980211502	TANK#1 EXCAVAT.	02/09/98	09:05	.	.	<10.	<0.20	<0.20	<0.20	<0.20	<0.20	.
19980211503	TANK#2 STOCKPIL	02/09/98	09:20	.	.	16.	<0.20	<0.20	<0.20	<0.20	<0.20	.
19980211504	TANK#2 STOCKPIL	02/09/98	09:25	.	.	<10.	<0.20	<0.20	0.41	<0.20	0.99	.
19980211505	TANK#2 EXCAVAT.	02/09/98	09:35	.	.	<10.	<0.20	<0.20	<0.20	<0.20	<0.20	.
19980211601	LAB SOIL	/ /		.	.	<10.	<0.20	<0.20	0.25	<0.20	0.40	.
19980211505S	TANK#2 EXCAVAT.	02/09/98	09:35	.	.	<10.	<0.20	<0.20	<0.20	<0.20	<0.20	.
19980211506	TANK#2 STOCKPIL	02/09/98	15:00	.	.	88.%	82.%	82.%	79.%	86.%	84.%	.
19980211506D	TANK#2 STOCKPIL	02/09/98	15:00	.	.	6300.	20.	19.	240.	82.	540.	.
				.	.	6200.	19.	21.	250.	88.	570.	.

RECEIVED FEB 17 1998

COMMENTS

The TPH/GAS values reported above are Total Purgeable Hydrocarbons quantitated by a gasoline calibration curve.

SAMPLE ID:19980211-	501	502	503	504	505	506
GRO	<10.	<10.	<10.	<10.	<10.	4900.
GRO AS GASOLINE	<10.	<10.	<10.	<10.	<10.	4900.

APPROVED BY:

DATE: 2/13/98

2

MIDCONTINENT
TESTING LABORATORIES

SET #3

2381 South Plaza Drive • P.O. Box 3388 • Rapid City, SD 57709
605/348-0111

PROJECT: C0731
DESCRIPTION: BLDG 1091 DEMO

JOE ALINE
SHUMAKER TRUCKING
P.O. BOX 1442
GREAT FALLS, MT 59403

ACCOUNT NUMBER: W1051
DATE RECEIVED: 02/09/98
TIME RECEIVED: 09:30 AM
REPORT DATE: 02/13/98

SAMPLE MATRIX: SOIL
TEST METHOD: GRO/8020
REPORTED UNITS: mg/KG

Set #3

LAB NUMBER	SAMPLE SITE	DATE	TIME	TPH WASTE OIL	TPH DIESEL	TPH GAS	MTBE	BENZENE	TOLUENE	ETHYL BENZENE	XYLENES	LEAD(ppm)
19980209503	TANK#1 STOCKPIL	02/05/98	14:40	.	.	490.	<0.40	0.35	0.66	6.9	10.	.
19980209503D	TANK#1 STOCKPIL	02/05/98	14:40	.	.	510.	<0.40	0.35	0.67	7.0	10.	.
19980209603	LAB SOIL	/ /		.	.	<10.	<0.20	<0.20	<0.20	<0.20	<0.20	.

RECEIVED FEB 17 1998

COMMENTS

The TPH/Gas values reported above are for Total Purgeable Hydrocarbons quantitated by a gasoline calibration curve.

SAMPLE ID: 19980209-	503	503D
GRO	320.	330.
GRO AS GASOLINE	320.	330.

APPROVED BY: [signature]

DATE: 2/13/98

RAW DATA

SECTION 15 – MISCELLANEOUS CHEMICAL USAGE

RAW DATA

SECTION 15 - MISCELLANEOUS CHEMICAL USAGE.

DUE TO ITS SIZE, THE RAW DATA FOR THIS SECTION IS NOT INCLUDED IN THIS APPENDIX. IF NEEDED, THE RAW DATA CAN BE OBTAINED FROM AFIERA/RSEQ (DSN 240-3305).

RAW DATA

SECTION 16 – OPEN DETONATION OF ENERGETIC MATERIALS

Scott R

Explosive Ordinance Disposal

Open Detonation

Type of munition disposed	Encapsulated Explosives: Quantity of the munition open detonated during the year (items/yr or rounds/yr)	Encapsulated Explosives: Mass of energetic material contained in the munition item (grams/item or grams/round or lb/charge)	Encapsulated Explosives: Estimated mass of donor charge used per munition item (grams/item or grams/round)	Non-Encapsulated Explosives: Total mass of energetic material which is open burned or open detonated during the year (lb/yr)
M112 Comp 4 (1.25lbs)	81ea/99		1.25lb/ea	101.25lb/99
Igniter Time Blast Fuze M60	104ea/99		.0001lb/ea	.0104lb/99
Chg Demo M118 (2lbs)	2ea/99		2lb/ea	4lb/99
Cap Blast Electric M6	138ea/99		.0028lb/ea	.3864lb/99
Cap Blast Non-Electric M7	110ea/99		.0027lb/ea	.297lb/99
Ctg Impulse 50 cal Electric	2ea/99		.0020lb/ea	.004lb/99
Cord Assembly Detonating	3270ft/99		.012lb/ft	39.24lb/99
Fuze, Blasting Time	1150ft/99		.0043lb/ft	4.945lb/99
Ctg 12 Gauge #00	9ea/99		.00001lb/ea	.00009lb/99
M1 Military Dynamite	6ea/99		.0039lb/ea	.0234lb/99
TNT 1lb block	8ea/99		.02lb/ea	.16lb/99

Open Burning

Type of munition disposed	Encapsulated Explosives: Quantity of the munition open burned during the year (items/yr or rounds/yr)	Encapsulated Explosives: Mass of energetic material contained in the munition item (grams/item or grams/round or lb/charge)	Non-Encapsulated Explosives: Total mass of energetic material which is open burned or open detonated during the year (lb/yr)

TRI Chemicals
Summary Report
for Malmstrom Explosive Ordnance Disposal

Report Selection Criteria:

Report Period Selected: Friday, January 01, 1999 to Friday, December 31, 1999

Areas Selected: All Areas

Activities Selected: Open Detonation, Range Training

TRI Chemical	Otherwise Use (lb)	Manufacture (lb)	Air Releases (lb)	Non-Air Releases (lb)	TRI Threshold Exceeded
1,3-Butadiene	0	0	0	0	
Acetaldehyde	0	0	0	0	
Aluminum (fume or dust)	1	0	0	0	
Ammonia	0	0	0	0	
Antimony compounds	0	0	0	0	
Asbestos (friable)	0	0	0	0	
Barium compounds	1	1	1	0	
Benzene	0	0	0	0	
Carbon disulfide	0	0	0	0	
Carbon tetrachloride	0	0	0	0	
Carbonyl sulfide	0	0	0	0	
Chlorine	0	0	0	0	
Chlorine dioxide	0	0	0	0	
Chloroform	0	0	0	0	
Chloromethane (Methyl chloride)	0	0	0	0	
Chromium	0	0	0	0	
Chromium (III) compounds	0	0	0	0	
Chromium (VI) compounds	0	0	0	0	
Copper	3	0	0	3	
Cyanide compounds	0	0	0	0	
Cyclohexane	0	0	0	0	

Note: Zeros indicate values less than 0.5 lb.

TRI Chemicals
Summary Report
for Malmstrom Explosive Ordnance Disposal

Report Selection Criteria:

Report Period Selected: Friday, January 01, 1999 to Friday, December 31, 1999

Areas Selected: All Areas

Activities Selected: Open Detonation, Range Training

TRI Chemical	Otherwise Use (lb)	Manufacture (lb)	Air Releases (lb)	Non-Air Releases (lb)	TRI Threshold Exceeded
Dichloromethane (Methylene chloride)	0	0	0	0	
Dinitrotoluene (mixed isomers)	0	0	0	0	
Diphenylamine	0	0	0	0	
Ethylbenzene	0	0	0	0	
Ethylene	0	0	0	0	
Formaldehyde	0	0	0	0	
Hexachloroethane	0	0	0	0	
Hydrazine	0	0	0	0	
Hydrochloric acid	0	0	0	0	
Hydrogen cyanide	0	0	0	0	
Hydrogen sulfide	0	0	0	0	
Lead	0	0	0	0	
Lead compounds (inorganic)	0	0	0	0	
Lead compounds (organic)	0	0	0	0	
Manganese	0	0	0	0	
Manganese compounds	0	0	0	0	
Mercury compounds	0	0	0	0	
n-Hexane	0	0	0	0	
Nickel	0	0	0	0	
Nitric acid	0	0	0	0	
Nitroglycerin	0	0	0	0	

Note: Zeros indicate values less than 0.5 lb.

TRI Chemicals
Summary Report

for Malmstrom Explosive Ordnance Disposal

Report Selection Criteria:

Report Period Selected: Friday, January 01, 1999 to Friday, December 31, 1999

Areas Selected: All Areas

Activities Selected: Open Detonation, Range Training

TRI Chemical	Otherwise Use (lb)	Manufac-ture (lb)	Air Releases (lb)	Non-Air Releases (lb)	TRI Threshold Exceeded
Ozone	0	0	0	0	
Propylene (Propene)	0	0	0	0	
Styrene	0	0	0	0	
Sulfuric acid	0	0	0	0	
Tetrachloroethylene (Perchloroethylene)	0	0	0	0	
Toluene	0	0	0	0	

Note: Zeros indicate values less than 0.5 lb.

RAW DATA

SECTION 17 – OZONE DEPLETING SUBSTANCES

ODS data from ~~Sgt~~ Sgt. Baker Thursday, 8/3/00 x2610

Ozone Depleting Substances

Bldg 471

SUMMARY

Process using the ODS [1]	Building location	Name of ODS containing product	Weight percent of ODS in this product	Amount used in or charged in 1999	Amount removed for disposal recycling or reclamation
Low Leak on [illegible] valve	1702	R-22	100%		Ø
Charged A/C	349	R-22		9 lbs.	
Fixed leak A/C	1840	R-22		430 lbs	
	1154	R-22		6 lbs	
Leak	330	R-22		3 lbs	
Leak-Repair	1152	R-22		10 lbs	
Leak-Repair	1440	R-22		26 lbs	
Leak-Repair/Fixed Leak	145	R-22		48 lbs	
Leak-Repair	500	R-22		15 lbs	
Leak Repair	768	R-22		43 lbs	
Fix Leak	shop?	R-22		4 lbs	
Leak/HP 62	1120	R-22		3 lbs	
Leak on expansion valve	1150	R-22		69 lbs	
Fixed Leak	2040	R-22		2 lbs	
~~[illegible]~~	~~[illegible]~~			—	
Recovered 216 lbs in 6 cylinders	803	R-502		—	-216
Recovered 195 lbs in 3 cylinders	803	R-12		—	-~~[illegible]~~195
Add Freon	581	R-22		5 lbs	Ø
Fixed Leak	1439	R-22		11.5 lbs	
	500	R-22		12 lbs	
Low refrigerant	Gas station	R-22			
Repair Leaks	1150	R-22		192 lbs	
Repair Leaks	145	R-22		14 lbs	
Repair leaks	1600	R-22		12.5 lbs	
Leak on chiller	768	R-22		74 lbs	
Leak on A/C unit	764	R-22		15 lbs	
A/C unit low	1702	R-22		5 lbs	
New Unit	219	R-22		1.5 lbs	
Replace compressor	1531	R-22		12 lbs	
Low on refrigerant	695	R-22		32 lbs	
Repair Leak	1154	R-22		10 lbs	
	145	R-502		5.5 lbs	

1999 Data

2000 data

[1] - Includes air conditioning units that were serviced at non-housing facilities in 1997.

didn't say which year

Fix Leak	145	R-22		18 lbs	
Fix Leak	1154	R-22		16 lbs	
Recovered 2 lbs	737	R-22	✓	—	2

Refrigerant Inventory By Assignment

Assigned To	Name	R-Type	Quantity
Location	Shop	R-11-	800 lbs
		R-12 - I	291 lbs
		R-22 - II	1910 lbs
		R-401A - II	30 lbs
		R-404A	24 lbs
		R-500	30 lbs
		R-502 - I	112 lbs
		Shop Total	3197 lbs
		Grand Total	3197 lbs

SgT. Baker couldn't really tell us what this table was all about, He thinks this was the ODC amounts they received but didn't come close to using

RAW DATA

SECTION 18 – PESTICIDE APPLICATION

Pesticide Application

Pesticide/Herbicide Name	Pesticide/Herbicide Stock Number	Pesticide/Herbicide Manufacturer	Amount of Pesticide/Herbicide Applied in 1999 gals ~~(lbs)~~	VOC content (weight %)	If Weight % is unknown: Active Ingredient (weight %)	Inert Portion (weight %)	VOC content of Inert Portion (weight %)	Name and Weight % of Each HAP Constituent
2-4-D Amine	00228-00145	Platte	480					
Round-up Pro	00524-00425	Monsanto	12.5					

Pesticide Application

Pesticide/Herbicide Name	EPA Reg # Pesticide/Herbicide Stock Number	Pesticide/Herbicide Manufacturer	Amount of Pesticide/Herbicide Applied in 1999 (lbs)	N/A ~~VOC content~~ (weight %)	If Weight % is unknown: Active Ingredient (weight %)	Inert Portion (weight %)	VOC content of Inert Portion (weight %)	Name and Weight % of Each HAP Constituent
Direx	1812-362	Drexel	125gal Liq (1043) 10387.T 15/bag/AN	~~80%~~	80%	20		
Round-up	524-475	MONSANTO	2GAl (16.7)	~~41%~~	41 %	59		
Arsenol	241-346	CYANAMID	5 Gallons (41.73)	~~28.7%~~	28.7%	71.3		
Oust	352-401	DuPont	4oz (0.25)	~~75%~~	75%	25		
Ramik Green	2393-185	HACO.	130.5 lbs	~~.025~~	.025	99.995		
Combat Super Bait	64240-2	Combat	12 EA	~~2%~~	2%	98		

Herbicide

Insecticide

DOD Hazardous Materials Information System
DoD 6050.5-LR
AS OF October 1998
Proprietary Version - For U.S. Government Use Only

FSC: 6840
NIIN: 012241269
Manufacturer's CAGE: 93098
Part No. Indicator: B
Part Number/Trade Name: COMBAT QUICK KILL FORMULA 2,51913

==

General Information

==

Item Name: INSECTICIDE COMBAT,LARGE
Company's Name: CLOROX CO THE HEADQUARTERS
Company's Street: 1221 BROADWAY
Company's P. O. Box: 24305
Company's City: OAKLAND
Company's State: CA
Company's Country: US
Company's Zip Code: 94623
Company's Emerg Ph #: 510-271-7000/800-424-9300(CHEMTREC)
Company's Info Ph #: 510-271-7000 / FAX 510-832-1463
Distributor/Vendor # 1: CLOROX CO., THE
Distributor/Vendor # 1 Cage: 4T284
Distributor/Vendor # 2:
Distributor/Vendor # 2 Cage:
Distributor/Vendor # 3:
Distributor/Vendor # 3 Cage:
Distributor/Vendor # 4:
Distributor/Vendor # 4 Cage:
Safety Data Action Code: A
Safety Focal Point: D
Record No. For Safety Entry: 004
Tot Safety Entries This Stk#: 004
Status: FE
Date MSDS Prepared: 01MAR97
Safety Data Review Date: 05AUG98
Supply Item Manager: CX
MSDS Preparer's Name: UNKNOWN
Preparer's Company:
Preparer's St Or P. O. Box:
Preparer's City:
Preparer's State:
Preparer's Zip Code:
Other MSDS Number:
MSDS Serial Number: CHMFG
Specification Number: NONE
Spec Type, Grade, Class: NONE
Hazard Characteristic Code: V5
Unit Of Issue: PG
Unit Of Issue Container Qty: 96X1.75/2.75G
Type Of Container: 8BAITSX12 BOX
Net Unit Weight: 0.37-0.58LB

Report for NIIN: 012241269

NRC/State License Number: NOT RELEVANT
Net Explosive Weight: N/R
Net Propellant Weight-Ammo: N/R
Coast Guard Ammunition Code: N/R

===

Ingredients/Identity Information

===

Proprietary: NO
Ingredient: FIPRONIL
Ingredient Sequence Number: 01
Percent: 0.03
Ingredient Action Code: A
Ingredient Focal Point: D
NIOSH (RTECS) Number: 9999999NR
CAS Number: 120068-37-3
OSHA PEL: NOT ESTABLISHED
ACGIH TLV: NOT ESTABLISHED
Other Recommended Limit: 0.1 MG/M3 (MFR)

Proprietary: NO
Ingredient: NON-HAZARDOUS INGREDIENTS
Ingredient Sequence Number: 02
Percent: BALANCE
Ingredient Action Code: A
Ingredient Focal Point: D
NIOSH (RTECS) Number: 1000314NH
CAS Number:
OSHA PEL: NOT ESTABLISHED
ACGIH TLV: NOT ESTABLISHED
Other Recommended Limit: NONE RECOMMENDED

===

Physical/Chemical Characteristics

===

Appearance And Odor: NON-TOXIC SOLID
Boiling Point: N/R
Melting Point: 140F,60C
Vapor Pressure (MM Hg/70 F): N/R
Vapor Density (Air=1): N/R
Specific Gravity: 1.27
Decomposition Temperature: UNKNOWN
Evaporation Rate And Ref: NOT RELEVANT
Solubility In Water: UNKNOWN
Percent Volatiles By Volume: N/R
Viscosity: NOT RELEVANT
pH: N/K
Radioactivity: NOT RELEVANT
Form (Radioactive Matl):
Magnetism (Milligauss): N/P
Corrosion Rate (IPY): UNKNOWN
Autoignition Temperature: N/K

MONSANTO PRODUCT NAME

ROUNDUP® Herbicide

§PRO – same ingredients different applications

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: ROUNDUP® herbicide

Synonyms: None

EPA Reg. No.: 524-445

Company ID: Monsanto Company
800 North Lindbergh
St. Louis, MO 63167, U.S.A.

Phone #s: Emergency Phone Number (call collect): (314) 694-4000
Non-Emergency Information: 1-800-332-3111

Revisions: Sections containing a revision or new information are marked with a ♣

MSDS Number: S00012114 **Date:** January, 1994 **Supersedes:** November, 1992

2. COMPOSITION INFORMATION ON INGREDIENTS

Chemical Ingredients: *Active Ingredient:* Glyphosate, N-(phosphonomethyl) glycine, in the form of its isopropylamine salt .... 41.0 %
Inert Ingredients: .... 59.0 %
100.0%

Component†	CAS Reg No
Ethoxylated Tallowamines*	61791-26-2
Glyphosate	1071-83-6

* Hazardous chemicals under the criteria of the OSHA Hazard Communication Standard (29 CFR §1910.1200)
†There are no chemicals listed as toxic under SARA §313 in this product.

See Section 8 for exposure limits.

3. HAZARDS IDENTIFICATION ♣

Emergency Overview:

Appearance & Odor: clear, viscous amber-colored solution

Warning Statements: Keep out of reach of children.
WARNING! AVISO!
Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand the label, find someone to explain it to you in detail.)
CAUSES SUBSTANTIAL BUT TEMPORARY EYE INJURY
HARMFUL IF SWALLOWED OR INHALED
REFORMULATION IS PROHIBITED
SEE INDIVIDUAL CONTAINER LABEL FOR REPACKAGING LIMITATIONS

Potential Adverse Health Effects:

Likely Routes of Exposure: Skin contact and inhalation

Eye Contact: ROUNDUP® herbicide may cause pain, redness and tearing based on toxicity studies.

Skin Contact: ROUNDUP® herbicide is no more than slightly toxic and no more than slightly irritating based on toxicity studies.

Ingestion: ROUNDUP® herbicide is no more than slightly toxic based on toxicity studies. No significant adverse health effects are expected to develop if only small amounts (less than a mouthful) are swallowed. Ingestion of similar formulations has been reported to produce gastrointestinal discomfort with irritation of the mouth, nausea, vomiting and diarrhea. Oral ingestion of large quantities of one similar product has been reported to result in hypotension and lung edema.

Inhalation: ROUNDUP® herbicide is no more than slightly toxic if inhaled based on toxicity studies.

4. FIRST AID MEASURES ♣

If In Eyes: Immediately hold eyelids open and flush with plenty of water. Get medical attention.

If Swallowed: This product will cause gastrointestinal tract irritation. Immediately dilute by swallowing water or milk. Get medical attention.

If Inhaled: Remove individual to fresh air. If not breathing, give artificial respiration, preferably mouth-to-mouth. Get medical attention.

NOTE: For additional human emergency first aid or treatment guidance, call collect, anytime, day or night (314) 694-4000.

5. FIRE FIGHTING MEASURES

Flash Point: >200°F **Method:** Pensky-Martens

Auto Ignition Temperature: Not determined

Extinguishing Media: Water spray, foam, dry chemical, CO_2, or any class B extinguishing agent.

Special Fire Fighting Procedures: Firefighters and others that may be exposed to vapors, mists, or products of combustion should wear full protective clothing and self-contained breathing apparatus. Equipment should be thoroughly cleaned after use.

Unusual Fire or Explosion Hazards: None

6. ACCIDENTAL RELEASE MEASURES

Observe all protection and safety precautions when cleaning up spills - See Exposure Controls/Personal Protection, Section 8.

<u>Small Spills:</u> For a spill less than one gallon on floor or other impervious surface, soak up with towels or other absorbent material and discard in the trash. Clean the spill area with soap and water and rinse the area thoroughly.

<u>Large Liquid Spills</u> on the floor or other impervious surface should be contained or diked and then absorbed with attapulgite, bentonite or other absorbent clays. Collect the contaminated absorbent, place in a metal drum and dispose of in accordance with the instructions provided under Disposal, Section 13 of this MSDS. Thoroughly scrub floor or other impervious surface with a strong industrial detergent and rinse with water.

Large spills that soak into the ground should be dug up, placed in metal drums and disposed of in accordance with instructions provided under DISPOSAL, Section 13 of this MSDS. Contact appropriate state agency when considering a land spreading disposal option.

Leaking containers should be separated from non-leakers and either the container or its contents transferred to a drum or other non-leaking container and disposed of in accordance with instructions provided under DISPOSAL, Section 13 of this MSDS. Any recovered spilled liquid should be similarly collected and disposed of.

7. HANDLING AND STORAGE ♣

Handling:

- Do not get in eyes or on clothing.
- Avoid breathing vapor or spray mist.
- Wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet.
- Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
- Do not apply directly to water, to areas where surface water is present or to intertidal areas below the mean high water mark.
- Do not contaminate water when disposing of equipment washwaters.

Storage:

- Do not contaminate water, foodstuffs, feed or seed by storage or disposal.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION ♣

Personal Protective Equipment:

Eye Protection: Wear chemical splash goggles during mixing/pouring operations or other activities in which eye contact with undiluted ROUNDUP® herbicide is likely to occur.

Skin Protection: Wear appropriate protective clothing to prevent skin contact. Applicators and other handlers must wear long-sleeved shirt, long pants, shoes plus socks and protective eyewear. Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

Respiratory Protection: *For Handling of the Undiluted Product:* Undiluted ROUNDUP® herbicide is not likely to present an airborne exposure concern during normal handling. In the event of an accidental discharge of the material during manufacture or handling which produces a heavy vapor or mist, workers should use NIOSH/MSHA approved equipment. In work situations where an air purifying respirator is appropriate to be used, use of a full face respirator equipped with purifying elements for protection against organic vapor and dust/mist approved for pesticides is recommended. Use cartridges with MSHA/NIOSH approval number TC-23C or canister with MSHA/NIOSH approval number TC-14G. Full facepiece replaces the need for chemical goggles. Observe respirator use limitations specified by the manufacturers. Respiratory protection programs must comply with 29 CFR §1910.134.

For Application of Product Diluted in accordance with label instructions: Respirators are not required for applications of use - dilutions of ROUNDUP® herbicide.

Ventilation: No special precautions are recommended.

Exposure Guidelines:

Material	OSHA PEL	ACGIH TLV
ROUNDUP® herbicide	None established	None established
Ethoxylated Tallowamine	None established	None established

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: clear, viscous amber-colored solution
Odor: practically odorless to slight amine-like odor
pH: 4.7 (1% solution)
Specific Gravity: 1.17 (Water = 1)

Note: These physical data are typical values based on material tested but may vary from sample to sample. Typical values should not be construed as a guaranteed analysis of any specific lot or as specification items.

10. STABILITY AND REACTIVITY

Chemical Stability: Stable for at least 5 years under normal conditions of warehouse storage.

Conditions to Avoid: None

Incompatibility with Other Materials: Spray solutions of this product should be mixed, stored or applied using only stainless steel, aluminum, fiberglass, plastic or plastic-lined containers.

DO NOT MIX, STORE OR APPLY THIS PRODUCT OR SPRAY SOLUTIONS OF THIS PRODUCT IN GALVANIZED OR UNLINED STEEL (EXCEPT STAINLESS STEEL) CONTAINERS OR SPRAY TANKS. This product or spray solutions of this product react with such containers and tanks to produce hydrogen gas which may form a highly combustible gas mixture. This gas mixture could flash or explode, causing serious personal injury, if ignited by open flame, spark, welder's torch, lighted cigarette or other ignition source.

Hazardous Decomposition Products: None

Hazardous Polymerization: Does not occur. This product can react with caustic (basic) materials to liberate heat. This is not a polymerization but rather a chemical neutralization in an acid base reaction.

11. TOXICOLOGICAL INFORMATION

TOXICOLOGICAL DATA

Data from laboratory studies conducted by Monsanto with ROUNDUP® herbicide are summarized below:

Single exposure (acute) studies indicate:

Oral -	Practically Non-toxic (Rat LD_{50}, >5,000 mg/Kg); FIFRA Category IV
Dermal -	Practically Non-toxic (Rabbit LD_{50}, >5000 mg/Kg); FIFRA Category IV
Inhalation -	Slightly toxic (Rat 4-hr LC_{50}, - 2.6 mg/L); FIFRA Category III
Eye Irritation -	Rabbits (6); 24-hr exp.; Slight to Moderate Irritation, Eye irritation was evident at day 14 but cleared by day 21 after exposure in 1 animal; FIFRA Category II; EC: Corneal Opacity - 0.0, Iris - 0.0, Erythema - 1.7, Chemosis - 0.8
Skin Irritation -	Rabbits (6); 4-hr exp.; Essentially Non-Irritating; Slight erythema (redness) clearing in all animals within 24 hours; FIFRA Category IV; EC: Erythema - 0.0, Edema-0.0

No skin allergy was observed in guinea pigs following repeated skin exposure.

COMPONENTS

Data from laboratory studies conducted by Monsanto and from the scientific literature on components of ROUNDUP® herbicide:

<u>Isopropylamine Salt of Glyphosate</u>

Data from studies with a formulation comprised of 62% isopropylamine salt of glyphosate (MON 0139) indicate the following:

In repeat dosing studies (6-month), dogs fed MON 0139 exhibited slight body weight changes. Following repeated skin exposure (3-week) to MON 0139, skin irritation was the primary effect in rabbits.

Additional toxicity information is available on glyphosate, the active herbicidal ingredient of MON 0139. Following repeated exposures (90-days) to glyphosate in their feed, decreased weight gains were noted at the highest test level in mice, while no treatment-related effects occurred in rats. Following repeated skin exposure (3 weeks) to glyphosate, slight skin irritation was the primary effect observed in rabbits. No skin allergy was observed in guinea pigs following repeated skin exposure. There was no evidence of effects on the nervous system, including delayed effects in chickens (repeat oral doses) or cholinesterase inhibition in rats (single oral doses). Reduced body weight gain and effects on liver

tissues were observed with long-term (2-year) feeding of glyphosate to mice at high-dose levels. Reduced body weight gain and eye changes were observed at the high-dose level in one long-term (2 year) feeding study with rats, while no treatment-related effects occurred in a second study. No adverse effects were observed in feeding studies with dogs. Glyphosate did not produce tumors in any of these studies. **Based on the results from the chronic studies, EPA has classified glyphosate in category E (evidence of non-carcinogenicity for humans).** No birth defects were noted in rats and rabbits given glyphosate orally during pregnancy, even at amounts which produced adverse effects on the mothers. Glyphosate was fed continuously to rats at very high dose levels for 2 successive generations. Toxicity was reported in offspring from the high dose, a level which also produced adverse effects on the mothers. In a 3 generation study conducted at lower dose levels, no effects were seen on the ability of male or female rats to reproduce. Glyphosate has produced no genetic changes in a variety of standard tests using animals and animal or bacterial cells.

Ethoxylated Tallowamine

The surfactant component of ROUNDUP® herbicide is reported to cause irritation to the eyes and skin and may contribute to the irritation potential reported for this herbicide. Ingestion may produce gastrointestinal irritation, nausea, vomiting and diarrhea.

12. ECOLOGICAL INFORMATION ♣

ROUNDUP® herbicide has been shown to be slightly to moderately toxic in aquatic studies. ROUNDUP® herbicide has been shown to be practically non-toxic to avian species following subacute dietary exposure.

Rainbow Trout 96-hr LC_{50}	22 mg/L (static)	Fathead minnow 96-hr LC_{50}	9.4 mg/L
Rainbow Trout 96-hr LC_{50}	8.2 mg/L (dynamic)	Channel catfish 96-hr LC_{50}	16 mg/L
Daphnia Magna 48-hr LC_{50}	37 mg/L (aeration)	Chinook Salmon 96-hr LC_{50}	20 mg/L
Daphnia Magna 48-hr LC_{50}	24 mg/L (without aeration)	Coho Salmon 96-hr LC_{50}	22 mg/L
Bluegill Sunfish 96-hr LC_{50}	5.8 mg/L (dynamic)	Algae S. Capricornutum 72-hr EC_{50}	2.1 mg/L
Bluegill Sunfish 96-hr LC_{50}	14 mg/L (static)	Bobwhite Quail 8-day LC_{50}	> 6300 ppm
Gammarus pseudolimnaeus 48-hr EC_{50}	42 mg/L	Mallard Duck 8-day LC_{50}:	>6300 ppm

13. DISPOSAL CONSIDERATIONS

Wastes resulting from the use of this product that cannot be used or chemically reprocessed should be disposed of in a landfill approved for pesticide disposal or in accordance with applicable Federal, state or local procedures.

Emptied container retains vapor and product residue. Observe all labeled safeguards until container is cleaned, reconditioned or destroyed. DO NOT CUT OR WELD ON OR NEAR THIS CONTAINER.

Metal Drums: Triple rinse container. Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.

Metal Bulk: Triple rinse emptied bulk containers. Then offer for recycling or reconditioning or disposal in a manner approved by state and local authorities.

Plastic Drums and mini bulk: Do not reuse container. Return container per the Monsanto container return program. If not returned, triple rinse container, then puncture and dispose of in a sanitary landfill, or by incineration, or, if allowed, by state and local authorities, by burning. If burned, stay out of smoke.

14. TRANSPORT INFORMATION ♣

Follow the precautions indicated in the Handling and Storage Section, Section 7 of this MSDS.

DOT Proper Shipping Name: Not Applicable
DOT Hazard Class/I.D. No.: Not Applicable
DOT Label: Not Applicable
U.S. Surface Freight Classification: Weed killing compound, N.O.I.B.N.

15. REGULATORY INFORMATION

SARA Hazard Notification:

Hazard Categories Under Criteria of SARA Title III Rules (40 CFR Part 370): Immediate

Section 313 Toxic Chemical(s): Not Applicable

Reportable Quantity (RQ) under U.S. CERCLA: Not Applicable

TSCA Inventory: All components are on the US EPA's TSCA Inventory List

16. OTHER

Reasons for revision: New CMA Format; Add WPS language; Add aquatic & avian tox data

This Material Safety Data Sheet (MSDS) serves different purposes than and DOES NOT REPLACE OR MODIFY THE EPA-APPROVED PRODUCT LABELING (attached to and accompanying the product container). This MSDS provides important health, safety, and environmental information for employers, employees, emergency responders and others handling large quantities of the product in activities generally other than product use, while the labeling provides that information specifically for product use in the ordinary course.

Use, storage and disposal of pesticide products are regulated by the EPA under the authority of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) through the product labeling, and all necessary and appropriate precautionary, use, storage, and disposal information is set forth on that labeling. It is a violation of federal law to use a pesticide product in any manner not prescribed on the EPA-approved label.

Although the information and recommendations set forth herein (hereinafter "Information") are presented in good faith and believed to be correct as of the date hereof, Monsanto Company makes no representations as to the completeness or accuracy thereof. Information is supplied upon the condition that the persons receiving same will make their own determination as to its suitability for their purposes prior to use. In no event will Monsanto Company be responsible for damages of any nature whatsoever resulting from the use of or reliance upon Information. NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OF ANY OTHER NATURE ARE MADE HEREUNDER WITH RESPECT TO INFORMATION OR THE PRODUCT TO WHICH INFORMATION REFERS.

 MSDSR.34

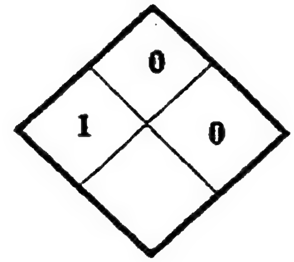
RAMIK GREEN

Pesticides

MATERIAL SAFETY DATA SHEET

Product Name: RAMIK GREEN

EPA Registration Number: 2393-498



SECTION I

Manufacturer's Name: HACO, INC.
537 Atlas Avenue P.O. Box 7190
Madison, Wisconsin 53707

Emergency Phone Numbers: 608-221-6200 HACO, INC.
608-233-5039 Mid-Wisconsin Security
800-424-9300 CHEMTREC

Date Prepared: 1/30/97

SECTION II - Hazardous Ingredients/Identity Information

Specific Chemical Identity	OSHA PEL	ACGIH TLV	Other Limits Recommended	% Ingr.
Diphacinone (CAS No. 82-66-6)	N/A	N/A	N/A	0.005
Sodium Saccharin (CAS No. 128-44-9)	N/A	N/A	N/A	< 1.000
Inert Ingredients: (non-hazardous) Grain, flavoring, preservative	N/A	N/A	N/A	> 98.995

THIS PRODUCT CONTAINS THE FOLLOWING SUBSTANCE WHICH IS REGULATED UNDER SARA, TITLE III, SECTION 313: None

SECTION III - Physical/Chemical Characteristics

Boiling Point:	N/A
Specific Gravity (water = 1)	Bulk Density = 31-33 lb/ft^3
Vapor Pressure (mm Hg)	N/A
Vapor Density (air=1)	N/A
Melting Point:	N/A
Evaporation Rate (Butyl Acetate=1)	N/A
Solubility in Water:	Slightly soluble.
Appearance and Odor:	Green extruded pellets with fish odor.

SECTION IV - Fire and Explosion Hazard Data

Flash Point: N/A

Flammability Limits: UEL: N/A LEL: N/A

Extinguishing Media: Fog or water spray, foam, carbon dioxide, dry chemical.

Special Fire Fighting Procedures: Potentially hazardous in severe fire. Wear self-contained breathing apparatus. Heat from fire may cause decomposition with evolution of toxic and irritating fumes. If water is used as an extinguishing media, diking is required to keep contaminated water out of all water supplies.

Unusual Fire and Explosion Hazards: None.

N/A = Not Available

SECTION V - Reactivity Data

Stability: This is a stable material.
Conditions to avoid: None known.

Incompatibility (Materials to Avoid): None known.

Hazardous Decomposition Products: Aromatic decomposition products: Carbon Monoxide, Carbon Dioxide, Water.

Hazardous Polymerization: Does not occur.
Conditions to avoid: None known.

SECTION VI - Health Hazard Data

Routes of Entry: Inhalation? No.
Skin? No.
Ingestion? Yes.

Health Hazards (Acute and Chronic): Inhibition of formation of prothrombin and reduction of clotting of blood. Acute Oral LD_{50} = 2.3 mg/kg for Diphacinone Technical at 98% Active Ingredient. (Equivalent to 46,000 mg/kg of Ramik Green)

Carcinogenicity: NTP? Saccharin is a candidate chemical.
IARC Monographs? Saccharin is a candidate chemical.
OSHA Regulated? No.
Saccharin has been determined to cause cancer in laboratory animals.

Signs and symptoms of exposure: Normal reaction to anticoagulant, i.e. nose bleeding, bleeding gums.

Medical Conditions Generally Aggravated by Exposure: Bleeding and other conditions which may be aggravated by extended clotting time.

Emergency and First Aid Procedures: INGESTION: For large doses within preceding 2-3 hours induce vomiting by drinking 1 or 2 glasses of water and touching back of throat with finger. DO NOT induce vomiting or give anything by mouth to unconscious persons. Call Physician immediately. Administration of Vitamin K_1 combined with blood transfusions, is indicated as in the case of hemorrhage caused by overdose of bishydroxycoumarin (Dicumarol).

SECTION VII - Precautions for Safe Handling and Use

Steps to Be Taken in Case Material is Released or Spilled: Sweep up, place in container and seal.

Waste Disposal Method: If these wastes cannot be disposed of by use according to label instructions, (i.e. garbage dumps, etc.) contact your State Pesticide Agency.

Precautions to Be Taken In Handling and Storing: Store in original container in a cool dry area separately from fertilizer, feed, or foodstuffs and away from products with strong odors.

Other Precautions: Keep in area suitable for pesticide storage. Keep out of reach of children and domestic animals. Avoid cross-contamination with other pesticides.

SECTION VIII - Control Measures

Respiratory Protection (specify type): Not generally required.
Ventilation: Local Exhaust? Not generally required.
Mechanical (general)? Not generally required.
Special? Not generally required.
Other? Not generally required.

Protective Gloves: None
Eye Protection: None.
Other Protective Clothing or Equipment: Use clothing and equipment consistent with good pesticide handling and application procedures.

Work/Hygienic Practices: Wash thoroughly after handling product.

SECTION IX - California Addendum (Proposition 65) Safe Drinking Water and Toxic Enforcement Act of 1986

The following specific warnings are hereby given relative to substances that the State of California has identified as carcinogens and/or reproductive hazards under Proposition 65:

☒ WARNING: This product contains a chemical known to the State of California to cause cancer. (Sodium Saccharin)

☐ WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

SECTION X - SARA TITLE III HAZARD CATEGORY:
For Reporting Under Sections 311 & 312

Immediate _No_ Delayed _Yes_ Fire _No_
Reactive _No_ Sudden Release of Pressure _No_

SECTION XI - Shipping Information

D.O.T. Hazard Classification: Not D.O.T. Regulated.
Bill of Lading Description: Vermin Exterminators, NOI

All information contained in the Material Safety Data Sheet is furnished free of charge and is intended for your evaluation. In our opinion the information is, as of the date of this Material Safety Data Sheet, reliable, however, it is your responsibility to determine the suitability of the information for your use. You are advised not to construe the information as absolutely complete since additional information may be necessary or desirable when particular, exceptional or variable conditions or circumstances exist or because of applicable laws or government regulations. Therefore, you should use this information only as a supplement to other information gathered by you and you must make independent determinations of the suitability and completeness of the information from all sources to assure both proper use of the material described herein and the safety and health of employees. Accordingly, no guarantee expressed or implied is made by HACO, INC. as to the results to be obtained based upon your use of the information nor does HACO, INC. assume any liability arising out of your use of the information.

AUG 17 '00 10:19 FR HACCO/LOVELAND IND. 608 221 7380 TO 915138257495 P.01/04

LOVELAND INDUSTRIES INC.

537 ATLAS AVE. (53714)
P.O. BOX 7190
MADISON, WI 53707-7190
FAX: 608-221-7380 TEL: 800-642-4699, ext.

FAX COVER SHEET

TO: Nick - EQ DATE: 8-17-00

FROM: Susan FAX NO.: (513) 825-7495

SUBJECT: Ramik Green NO PAGES: 4 incls cover

EPA No. 2393-498

MSDS follows

STATUS OF ORIGINAL: ____ To follow by mail
____ To remain in this office

IF YOU DO NOT RECEIVE ALL PAGES, PLEASE CALL THE ABOVE NUMBER.

AMERICAN CYANAMID CO.
PARSIPPANY, NJ 07054

MSDS NO. AG09107-5
CAS NO. Mixture
DATE: JAN 05, 1999

MATERIAL SAFETY DATA SHEET

EMERGENCY TELEPHONE: (973)-683-3100 (U.S.A.)
(800)-424-9300 (CHEMTREC)

1 PRODUCT IDENTIFICATION

TRADE NAME: ARSENAL® Herbicide (2 ASU)

SYNONYMS: Imazapyr, isopropylamine salt.
2-(4-isopropyl-4-methyl-5-oxo-2-imidazolin-2-yl)nicotinic acid, salt with isopropylamine (1:1)
2-[4,5-dihydro-4-methyl-4-(-methylethyl)-5-oxo-1H-imidazol-2-yl]-3-pyri-dinecarboxylic acid, salt with 2-propanamine (1:1); ARSENAL NS Herbicide; AC252,925; CL252,925

CHEMICAL FAMILY: Imidazolinone
MOLECULAR FORMULA: $C_{13}H_{15}N_3O_3.C_3H_9N$
MOLECULAR WEIGHT: 320.400
USAGE: Herbicide

2 COMPOSITION INFORMATION

COMPONENT	CAS. NO.	%	PEL/TLV
Inerts		71.30	
Isopropylamine Salt of Imazapyr	081510-83-0	28.70	None Established

REFERENCE: Inerts
Isopropylamine Salt of Imazapyr — None

3 HAZARD IDENTIFICATION

CAUTION! Keep out of reach of children.
Avoid contact with eyes, skin, or clothing.
Avoid breathing spray mist.

4 FIRST-AID MEASURES

EMERGENCY AND FIRST AID PROCEDURES:

IF ON SKIN: Wash skin with plenty of soap and water. Get medical attention if irritation persists.

IF IN EYES: Flush eyes with plenty of water. Get medical attention if irritation persists.

IF SWALLOWED: Drink two glasses of water, induce vomiting if the person is conscious. Obtain medical attention promptly.

IF INHALED: Remove subject to fresh air.

NOTES TO PHYSICIAN:
There is no specific antidote. Treatment of overexposure should be directed at the control of symptoms and the clinical condition.

MEDICAL CONDITION AGGRAVATED BY OVEREXPOSURE:
A knowledge of the available toxicology information and of the physical and chemical properties of the material suggests that overexposure is unlikely to aggravate existing medical conditions.

5 FIRE FIGHTING MEASURES

FIRE EXTINGUISHING MEDIA:

Use water, alcohol foam, dry chemical or carbon dioxide to extinguish fires.

FIRE CONTROL TACTICS:

Wear self-contained, positive pressure breathing apparatus and full fire fighting protective clothing.

Keep unnecessary people away. Use as little water as possible. Dike area of fire to prevent pesticide run-off. Use spray or fog - solid stream may cause spreading.

Do not decontaminate personnel or equipment, or handle broken packages or containers without protective equipment as specified in the Exposure Control Section. Decontaminate emergency personnel with soap and water before leaving the fire area.

Avoid breathing dusts, vapors and fumes from burning materials. Control run-off water - if water enters a drainage system, advise the authorities downstream.

NFPA HAZARD RATING

```
0 Least            1                  Flammability
1 Slight          / \                     / \
2 Moderate       1   0             Health    Reactivity
3 High            \ /                     \ /
4 Severe                                Special
```

6 ACCIDENTAL RELEASE MEASURES

Wear appropriate clothing and personal protective equipment (See "Exposure Control".)

Keep away from drains, surface and ground water, and soil.

Dike spill area to prevent spill from spreading. Absorb the spilled material with an inert absorbent such as granular clay or sawdust. Shovel or sweep the absorbed spill into covered containers for proper disposal. (See "Waste Disposal".)

Rinse the spill area and any tools or implements several times with soapy water. Contain and absorb this rinsate with inert absorbents and place into the same covered container as the spilled material.

Spills to the soil can be shoveled directly into covered containers for disposal.

Depending on local spill reporting requirements and the amount released to the environment, it may be necessary to notify the regulatory authorities.

7 HANDLING AND STORAGE

Do not contaminate water, food, or feed by storage or disposal. Store in a secure, dry, well-ventilated, separate room, building or covered area.

Not for use or storage in or around the home.

Keep away from sources of ignition and protect from exposure to fire and heat.

Segregate from oxidizers and incompatible materials listed in the Reactivity Data Section.

8 EXPOSURE CONTROL/PERSONAL PROTECTION

During formulation of this product, use the following recommended industrial hygiene practices:

Wear chemical splash goggles to prevent contact with the skin. Wash thoroughly with soap and water after handling. Remove contaminated clothing and wash before reuse.

For end-users, refer to product label for personal protective clothing/equipment if required.

9 PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AND ODOR:	Clear blue liquid; slight ammonium odor.
FLASH POINT:	> 98.9°C (210°F) - SETA Closed Cup
BOILING POINT:	Not available
FLAMMABLE LIMITS (% BY VOL.):	Not applicable
AUTOIGNITION TEMP:	> 93°C (200°F)
MELTING POINT:	Not applicable
DECOMPOSITION TEMP:	Not available
VAPOR PRESSURE:	Not available
SPECIFIC GRAVITY:	1.04 - 1.07
VAPOR DENSITY:	Not available
% VOLATILITY (BY VOL.):	71
OCTANOL / H_2O PARTITION COEF.:	1.3 for the active ingredient at 22°C
PH:	6.6 - 7.2
SATURATION IN AIR (BY VOL.):	Not available
EVAPORATION RATE:	Not available
SOLUBILITY IN WATER:	Soluble

10 STABILITY AND REACTIVITY

STABILITY:	Stable
POLYMERIZATION:	Will not occur
INCOMPATIBLE MATERIALS:	Strong oxidizing and reducing agents. Corrosive to mild steel and brass.
HAZARDOUS DECOMPOSITION PRODUCTS:	Combustion may produce oxides of carbon and nitrogen.

11 TOXICOLOGICAL INFORMATION

ACUTE TOXICITY DATA:

Rat Oral LD_{50}:

Sex	LD_{50} [95% Confidence Limits]
Male	>5000 mg/kg
Female	>5000 mg/kg
Combined	>5000 mg/kg

The product is considered to be practically nontoxic by ingestion in single doses.

Rabbit Dermal LD_{50} [Intact Skin]:

Sex	LD_{50} [95% Confidence Limits]
Male	>2148 mg/kg or >2 ml/kg
Female	>2148 mg/kg or >2 ml/kg
Combined	>2148 mg/kg or >2 ml/kg

The product is considered to be no more than slightly toxic by single skin applications.

Rabbit Eye Irritation:

The product was irritating to the rabbit eye with complete recovery by 7 days.

Rabbit Skin Irritation:

The product was mildly irritating to the rabbit skin.

CHRONIC TOXICITY DATA:

Mutagenicity: No mutagenic activity was observed in ARSENAL Technical (Imazapyr) by all test methods used. These included unscheduled DNA Synthesis Rat Hepatocyte Assay, in vitro Chinese Hamster Ovary (CHO)/Hypoxanthine Guanine Phosphoribosyl Transferase (HGPRT) Mutation Assay, Bacterial/Microsome Reverse Mutation (Ames) Test and in vitro Chromosomal Aberrations in Chinese Hamster Ovary Cells.

Teratogenicity: No teratogenic or fetotoxic effects were found at all dose levels tested in mice and rats.

Imazapyr is not listed as a human carcinogen by the IARC, OSHA or NTP. Isopropylamine salt present in this formulation is not listed as a human carcinogen by the IARC, OSHA or NTP.

12 ECOLOGICAL INFORMATION

This product is harmless to fish and toxic to aquatic invertebrates. There is no data for algae or honeybees for this specific formulation. However, based on standard laboratory studies with the product's active ingredient, imazapyr, this product is expected to be harmful to algae and harmless to honeybees.

13 DISPOSAL CONSIDERATIONS

To avoid disposal, all attempts should be made to use this product completely, in accordance with its registered use. If this is not possible, handle with care and dispose in a safe manner.

Empty containers or liners may retain some product residues. DO NOT REUSE. Rinse the container or liner as needed for disposal. Render it unusable by crushing or puncturing. Dispose of the container and any rinsate in a safe manner.

Follow all applicable community, national or regional regulations regarding waste management methods.

14 TRANSPORT INFORMATION

DOT REGULATORY INFORMATION

DOT HAZARDOUS DESCRIPTION - NOT REGULATED (WEED KILLING COMPOUND, NOI)

DOT LABEL -

DOT CLASS/DIVISION	UN NUMBER	GROUP	Package Instructions/ Max Net Qty Per Pkg Passenger	Cargo

15 REGULATORY INFORMATION

PRODUCT HAZARD CLASSIFICATION UNDER SECTION 311 OF SARA				
acute (Y)	chronic (N)	fire (N)	reactive (N)	pressure (N)

SARA 313 This material is not listed as a toxic chemical under SARA 313.

EHS RQ This material is not listed as an extremely hazardous substance under SARA and does not have an EHS reportable quantity.

CERCLA RQ This material does not have a reportable quantity under CERCLA.

RCRA This material, when discarded, is not a RCRA-listed hazardous waste. It is the responsibility of the generator to determine at the time of disposal whether this material meets the criteria for a RCRA-characteristic waste.

16 OTHER INFORMATION

None known

APPENDIX

The information and statements herein are believed to be reliable but are not to be construed as a warranty or representation for which we assume legal responsibility. Users should undertake sufficient verification and testing to determine the suitability for their own particular purpose of any information or products referred to herein. NO WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE IS MADE.

SOURCE AND DATE INFORMATION

PREVIOUS MSDS NO.: AG09107-04

REVISION DATE: JAN 05, 1999

EMERGENCY CONTACT INFORMATION

PHONE: (973)-683-3100 (U.S.A.)

(800)-424-9300 (CHEMTREC)

MATERIAL SAFETY DATA SHEET

WILBUR-ELLIS COMPANY
P.O. BOX 16458
FRESNO, CA 93755

EMERGENCY TELEPHONE NUMBER (209) 226-1934

24 HOUR EMERGENCY TELEPHONE NUMBER CHEMTREC: (800) 424-9300

SECTION 1 NAME

PRODUCT/TRADE NAME: AMINE 4
EPA REGISTRATION #: 228-145-2935
CHEMICAL NAME/COMMON NAME:
Dimethylamine Salt of 2,4-Dichlorophenoxy Acetic Acid/2,4-D

SECTION 2 HAZARDOUS INGREDIENTS

		CAS#	OSHA PEL	ACGIH TLV
2,4-D	47.3%	2008-39-1	10 mg/m3	10 mg/m3

SECTION 3 PHYSICAL DATA

SPECIFIC GRAVITY (H_2O = 1): 1.16
VAPOR DENSITY (AIR = 1): NE
ODOR: Phenolic
APPEARANCE: Amber Liquid
FLASH POINT/METHOD: >200 Deg. F
VAPOR PRESSURE (mmHg): NE
SOLUBILITY IN H2O: Soluble

MELTING POINT: NA
% VOLATILES BY VOL.: NA

SECTION 4 FIRE & EXPLOSION HAZARD

EXTINGUISHING MEDIA: [X] Water Fog [X] Foam [X] Alcohol Foam [X] CO2 [X] Dry Chemical [ ] Other

FIRE FIGHTING PRECAUTIONS & HAZARDS:
Fight fire upwind. Wear positive pressure self-contained breathing apparatus and full protective clothing. Avoid breathing smoke and mist. Avoid fallout and runoff. Dike area to prevent entering drains, sewers, and water courses. Evacuate people downwind from fire.

SECTION 5 CARCINOGEN STATUS

[ ] OSHA [ ] NTP [X] IARC
[ ] No Listing Type 2,4-D

SECTION 6 REACTIVITY

[X] Stable
[ ] Unstable

HAZARDOUS POLYMERIZATION
[ ] May Occur [X] Will Not Occur

AVOID:
Oxidizers, Acids and bases

HAZARDOUS DECOMPOSITION PRODUCTS:
COx, NOx, HCl

SECTION 7 SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE OF SPILL:
Wear appropriate respiratory protective equipment. Absorb with inert material. Vacuum or sweep material up and place in in approved disposal container.

DECONTAMINATION:
Treat contaminated area with detergent and water. Absorb with inert material and place in disposal container. Repeat as

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT IDENTIFICATION

Product Name: Direx 80 DF

HAZARD CLASSIFICATION (0-minimal, 1-slight, 2-moderate, 3-serious,4-severe)

NFPA:	HEALTH-1 FIRE-1 REACTIVITY-0
HMIS:	HEALTH-2 FIRE-1 REACTIVITY-0

MANUFACTURER NAME AND ADDRESS

Griffin L.L.C.	Griffin (Europe) S.A.	Griffin FE (Malaysia) S/B
2509 Rocky Ford Road	c/o Minervastraat 8	P.O. Box 6506
P.O. Box 1847	B-1930 Zaventem	47300 KG Tunku
Valdosta, GA 31603-1847	Belgium	Petaling Jaya
		Malaysia

EMERGENCY TELEPHONE NUMBERS

Griffin L.L.C. (USA):	(+1) (800) 237 1854
Griffin (Europe) S.A.:	(+32)-2-720 6644
Griffin FE (Malaysia) S/B:	(+60)-3-757 4773
Chemtrec:	(+1) (800) 424 9300

2. COMPOSITION/ INFORMATION ON INGREDIENTS

Component Name	% by Wt.	CAS#	ACGIH (TLV)	OSHA (PEL)
Diuron	80.0	330-54-1	10 mg/m^3	not established

Components not precisely identified are proprietary or not hazardous.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Brown granule that may cause irritation to the eyes and nose. Slightly toxic orally and dermally. See below for route-specific details.

POTENTIAL HEALTH EFFECTS

Inhalation: May cause irritation to the nose. Overexposure by inhalation may cause liver enlargement, spleen and thyroid effects, red blood cell destruction, reduction of the blood's oxygen carrying capacity with cyanosis (bluish discoloration), weakness, or shortness of breath by formation of methemoglobin. No reports of human sensitization.

Eye Irritation: May cause irritation. Produced mild to moderate corneal opacity, mild conjunctival redness and slight to mild chemosis in unwashed rabbit eyes. Eyes normal within 14 days after exposure. Considered a moderate eye irritant. May cause eye irritation with discomfort, tearing, or blurring of vision.

DOD Hazardous Materials Information System

DoD 6050.5-LR

AS OF April 1996

Proprietary Version - For U.S. Government Use Only

FSC: 6840

NIIN: 00F024602

Manufacturer's CAGE: 0ERJ7

Part No. Indicator: A

Part Number/Trade Name: OUST HERBICIDE 75%

===

General Information

===

Item Name: HERBICIDE

Company's Name: E I DUPONT DE NEMOURS & CO, INC.

Company's Street: 1007 MARKET STREET

Company's P. O. Box: N/K

Company's City: WILMINGTON

Company's State: DE

Company's Country: US

Company's Zip Code: 19898

Company's Emerg Ph #: (800) 441-3637

Company's Info Ph #: (800) 441-7515

Distributor/Vendor # 1:

Distributor/Vendor # 1 Cage:

Distributor/Vendor # 2:

Distributor/Vendor # 2 Cage:

Distributor/Vendor # 3:

Distributor/Vendor # 3 Cage:

Distributor/Vendor # 4:

Distributor/Vendor # 4 Cage:

Safety Data Action Code:

Safety Focal Point: F

Record No. For Safety Entry: 001

Tot Safety Entries This Stk#: 001

Status: SE

Date MSDS Prepared: 04MAR91

Safety Data Review Date: 22SEP92

Supply Item Manager:

MSDS Preparer's Name:

Preparer's Company: E I DUPONT DE NEMOURS & CO, INC.

Preparer's St Or P. O. Box: 1007 MARKET STREET

Preparer's City: WILMINGTON

Preparer's State: DE

Preparer's Zip Code: 19898

Other MSDS Number:

MSDS Serial Number: BNXZC

Specification Number:

Spec Type, Grade, Class:

Hazard Characteristic Code:

Unit Of Issue:

Unit Of Issue Container Qty:

Type Of Container:

Net Unit Weight:

Report for NIIN: 00F024602

NRC/State License Number:
Net Explosive Weight:
Net Propellant Weight-Ammo:
Coast Guard Ammunition Code:

===

Ingredients/Identity Information

===

Proprietary: NO
Ingredient: BENZOIC ACID, O-((3-(4,6-DIMETHYL-2-PYRIMIDINYL)UREIDO)
SULFONYL)-,METHYL ESTER
Ingredient Sequence Number: 01
Percent: 75%
Ingredient Action Code:
Ingredient Focal Point: F
NIOSH (RTECS) Number: DG9096550
CAS Number: 74222-97-2
OSHA PEL: N/K
ACGIH TLV: 10 MG/CUM (TOT DUST)
Other Recommended Limit: N/K

Proprietary: NO
Ingredient: INERT INGREDIENTS (TYPE NOT SPECIFIED)
Ingredient Sequence Number: 02
Percent: 25%
Ingredient Action Code:
Ingredient Focal Point: F
NIOSH (RTECS) Number: 1000082II
CAS Number:
OSHA PEL: N/K
ACGIH TLV: N/K
Other Recommended Limit: N/K

===

Physical/Chemical Characteristics

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Appearance And Odor: OFF-WHITE SOLID, DRY FLOWABLE, ODORLESS.
Boiling Point: N/K
Melting Point: N/K
Vapor Pressure (MM Hg/70 F): N/K
Vapor Density (Air=1): N/K
Specific Gravity: 1.46
Decomposition Temperature: N/K
Evaporation Rate And Ref: N/K
Solubility In Water: DISPERSIBLE
Percent Volatiles By Volume: N/K
Viscosity:
pH: N/K
Radioactivity:
Form (Radioactive Matl):
Magnetism (Milligauss):
Corrosion Rate (IPY): N/K
Autoignition Temperature:

DOD HAZARDOUS MATERIALS INFORMATION SYSTEM
DOD 6050.5-L
AS OF AUGUST 1991
FOR U.S. GOVERNMENT USE ONLY

FSC: 6840
NIIN: 011800167
MANUFACTURER CAGE: 93098
PART NO. INDICATOR: A
PART NUMBER/TRADE NAME: COMBAT ROACH CONTROL SYSTEM

===

GENERAL INFORMATION

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ITEM NAME: INSECTICIDE, COMBAT
MANUFACTURER NAME: CLOROX CO THE HEADQUARTERS
MANUFACTURER STREET: 1221 BROADWAY
MANUFACTURER P.O. BOX: 24305
MANUFACTURER CITY: OAKLAND
MANUFACTURER STATE: CA
MANUFACTURER COUNTRY: US
MANUFACTURER ZIP CODE:
MANUFACTURER EMERG PH #: 510-271-7000
MANUFACTURER INFO PH #: 510-271-7000 / FAX 510-832-1463
DISTRIBUTOR/VENDOR # 1: EHRLICH J C CHEMICAL CO INC
DISTRIBUTOR/VENDOR # 1 CAGE: 8C885
DISTRIBUTOR/VENDOR # 2: GOURMET INQUE INC (708-296-6192)
DISTRIBUTOR/VENDOR # 2 CAGE: 0TNN7
DISTRIBUTOR/VENDOR # 3:
DISTRIBUTOR/VENDOR # 3 CAGE:
DISTRIBUTOR/VENDOR # 4:
DISTRIBUTOR/VENDOR # 4 CAGE:
SAFETY DATA ACTION CODE:
SAFETY FOCAL POINT: D
RECORD NO. FOR SAFETY ENTRY: 002
TOT SAFETY ENTRIES THIS STK#: 002
STATUS: SE
DATE MSDS PREPARED: 01APR93
SAFETY DATA REVIEW DATE: 12NOV93
SUPPLY ITEM MANAGER: CX
MSDS PREPARER NAME:
PREPARER COMPANY:
PREPARER ST OR P.O. BOX:
PREPARER CITY:
PREPARER STATE:
PREPARER ZIP CODE:
OTHER MSDS NUMBER:
MSDS SERIAL NUMBER: BMSRP
SPECIFICATION NUMBER: NONE
SPEC TYPE, GRADE, CLASS: NONE
HAZARAD CHARACTERISTIC CODE: T5
UNIT OF ISSUE: BX
UNIT OF ISSUE CONTAINER QTY: 72 EACH
TYPE OF CONTAINER: SEALED PLASTI
NET UNIT WEIGHT:
NRC/STATE LICENSE NUMBER: N/R
NET EXPLOSIVE WEIGHT:
NET PROPELLANT WEIGHT-AMMO:
COAST GUARD AMMUNITATION CODE: N/R

===

INGREDIENTS/IDENTITY INFORMATION

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PROPRIETARY: NO
INGREDIENT: HYDRAMETHYLNON
HYDRAMETHYLNON
INGREDIENT SEQUENCE NUMBER: 01
PERCENT: N/K

ENT FOCAL POINT: D
(RTECS) NUMBER: WW7583000
UMBER: 67485-29-4
PEL: NOT ESTABLISHED
IH TLV: NOT ESTABLISHED
HER RECOMMENDED LIMIT: 1.4 MG/M3

INGREDIENTS/IDENTITY INFORMATION

PROPRIETARY: NO
INGREDIENT: INERT INGREDIENTS
INERT INGREDIENTS
INGREDIENT SEQUENCE NUMBER: 02
PERCENT: 98
INGREDIENT ACTION CODE:
INGREDIENT FOCAL POINT: D
NIOSH (RTECS) NUMBER: 1000082II
CAS NUMBER:
OSHA PEL: N/K
ACGIH TLV: N/K
OTHER RECOMMENDED LIMIT:

PHYSICAL/CHEMICAL CHARACTERISTICS

APPEARANCE AND ODOR: HYDRAMETHYLNON BASED FOOD BUILT IN A CHILD RESISTANT PLASTIC STATION
BOILING POINT: NOT GIVEN
MELTING POINT: 140F, 60C
VAPOR PRESSURE (MM HG/70 F): NOT GIVEN
VAPOR DENSITY (AIR=1): NOT GIVEN
SPECIFIC GRAVITY: 1.4
DECOMPOSITION TEMPERATURE: UNKNOWN
EVAPORATION RATE AND REF: NOT GIVEN
SOLUBILITY IN WATER: NOT GIVEN
PERCENT VOLATILES BY VOLUME: N/K
VISCOSITY:
PH: N/K
RADIOACTIVITY:
FORM (RADIOACTIVE MATL):
MAGNETISM (MILLIGAUSS):
CORROSION RATE (IPY): UNKNOWN
AUTOIGNITION TEMPERATURE:

FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: >200F, >93C
FLASH POINT METHOD: TCC
LOWER EXPLOSIVE LIMIT: NOT GIVEN
UPPER EXPLOSIVE LIMIT: NOT GIVEN
EXTINGUISHING MEDIA: WATER, FOAM, CARBON DIOXIDE, DRY CHEMICAL

SPECIAL FIRE FIGHTING PROC: NOT FLAMMABLE. USE PROCEDURES SUITABLE FOR SURROUNDING FIRE.

UNUSUAL FIRE AND ELPL HAZRDS: NONE SPECIFIED BY MANUFACTURER.

REACTIVITY DATE

STABILITY: YES
COND TO AVOID (STABILITY): NONE SPECIFIED BY MANUFACTURER.

MATERIALS TO AVOID: NONE SPECIFIED BY MANUFACTURER.

Symptoms can range from flu-type symptoms to those similar to alcoholism. Absorption may lead directly to cardiovascular collapse and death.

PRIMARY ROUTES OF ENTRY-
EYES/SKIN: Yes INHALATION: Yes INGESTION: Not likely

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE-
Pre-existing respiratory ailments.

EMERGENCY FIRST AID PROCEDURES-
EYES: Flood with water for at least 15 minutes - Get immediate medical attention.
SKIN: Wash with soap and water. Remove contaminated clothing. If irritation occurs and persists, get medical attention.
INHALATION: Remove victim to fresh air. If breathing is difficult, give oxygen. If breathing has stopped, administer artificial respiration (mouth to mouth is preferred) if trained - get immediate medical attention.
INGESTION: DO NOT INDUCE VOMITING! GET IMMEDATE MEDICAL ATTENTION! ADVISE PHYSICIAN PRODUCT CONTAINS CHLOLONESTERASE INHIBITOR.

SECTION 4 - CHEMICAL DATA

BOILING POINT (F)....: 183 F
VAPOR PRESSURE (mmHg): N.D.
VAPOR DENSITY (AIR=1): N.D.

SPECIFIC GRAVITY (WATER=1).............: 1.01
PERCENT VOLATILE BY VOLUME (%).........: 30%
EVAPORATION RATE (n-Butyl Acetate =1): N.D.

SOLUBILITY IN WATER-
Complete

APPEARANCE AND ODOR INFORMATION-
Pale yellow to light brown liquid, slight pungent odor.

SECTION 5 - PHYSICAL HAZARD DATA

FLASH POINT (Method Used): 108 F FLAMMABLE LIMITS : Lel=N.D. UEL=N.D.

EXTINGUISHING MEDIA-
Water spray or fog, foam, dry chemical or CO2

SPECIAL FIRE FIGHTING PROCEDURES-
Keep fire exposed containers cool with water spray. Use full protective gear including NIOSH-approved SCBA. Water may be ineffective for putting out fires unless used by experienced fire-fighters.

UNUSUAL FIRE AND EXPLOSION HAZARDS-
Incomplete combustion may produce fumes, smoke, carbon monoxide, aldehydes, and other toxic decomosition products.

RAW DATA

SECTION 19 – PHOTOGRAPHIC AND LITHOGRAPHIC EQUIPMENT

6750010410102 SV02 REVERSAL BATH AND REPLENISHER = 1278076 CONSUMED IN USE 32.00 OZ BT

7B594 1 — 1 KODAK PROCESSING LABORATORY 1.01 9,599.00 127 8076 REVERSAL BATH AND REPLENISHER WORKING SOLUTION Y 06/10/1995

0% VOC
0% HAP

0.00	1.00 %	W	0000079094 UE5950000 PROPIONIC ACID	- NO
1.00	5.00 %	W	0000137406 UF7525000 PROPIONIC ACID, SODIUM SALT	- NO
0.00	1.00 %	W	0002235430 SZ9880000 SUBSTITUTED PHOSPHONATE	- NO
0.00	1.00 %	W	0006419198 SZ9860000 PHOSPHONIC ACID, (NITRILOTRIS(METHYLENE))TRI-	- NO
95.00	99.00 %	W	0007732185 ZC0110000 WATER	- NO
0.00	1.00 %	W	0007772998 XP8700000 STANNOUS CHLORIDE	- NO

Total Qty Issued: 2.00

6750010418683 SV02 REPLENISHER,DEVELOP = 8878329 CONSUMED IN USE 1.25 GL BT

19139 1 — 1 EASTMAN KODAK CO 1.19 8,088.00 100 1866,COLOR DEVELOPER REPLENISHER Y 02/15/1991

0% VOC
0% HAP

0.00	1.00 %	W	0001310583 TT2100000 POTASSIUM HYDROXIDE	- NO
1.00	5.00 %	W	0002235430 SZ9880000 SUBSTITUTED PHOSPHONATE	- NO
80.00	88.00 %	W	0007732185 ZC0110000 WATER	- NO
1.00	5.00 %	W	0007757837 WE215000(SODIUM SULFITE	- NO
10.00	15.00 %	W	0007778532 TC8450000 PHOSPHORIC ACID, TRIPOTASSIUM SALT	- NO

Total Qty Issued: 4.00

19139 1 — 2 EASTMAN KODAK CO 1.08 7,080.00 100 1866,COLOR DEVELOPER REPLENISHER Y 02/13/1991

25% VOC
0% HAP

1.00	5.00 %	W	0007631905 VZ2000000 SODIUM BISULFITE	- NO
70.00	80.00 %	W	0007732185 ZC0110000 WATER	- NO
15.00	25.00 %	W	0025646713 PB0431000 METHANESULFONAMIDE, N-(2-(4-AMINO-N-ETHYL-M-TOLUIDINO)ETHYL)-, SULFATE (2:3)	VOC

Total Qty Issued: 4.00

6750010434671 SV02 FIXING BATH,PHOTOGRAPHIC,5 GAL 1278019 CONSUMED IN USE 64.00 OZ BT

7B594 1 — 1 KODAK PROCESSING LABORATORY 1.03 9,095.00 BATH, FIXING, PHOTOGRAPHIC Y 06/07/1995

0% VOC
0% HAP

5.00	10.00 %	V	0007631905 VZ2000000 SODIUM BISULFITE	- NO
35.00	40.00 %	V	0007732185 ZC0110000 WATER	- NO
1.00	5.00 %	V	0007757837 WE215000(SODIUM SULFITE	- NO
50.00	55.00 %	V	0007783188 XN6465000 AMMONIUM THIOSULFATE	- NO
1.00	5.00 %	V	0010196040 WT350500(AMMONIUM SULFITE	- NO

Total Qty Issued: 2.00

6750010434672 SV02 REPLENISHER,DEVELOPER,PHOTO = 1564 0 K CONSUMED IN USE 128.00 OZ BT

7B594 1 — 1 KODAK PROCESSING LABORATORY 1.05 9,095.00 REPLENISHER, DEVELOPER, PHOTOGRAPHIC Y 11/15/1995

10% VOC
0% HAP

1.00	5.00 %	V	0000497198 VZ4050000 SODIUM CARBONATE (2:1)	- NO
5.00	10.00 %	V	0000584087 TS7750000 POTASSIUM CARBONATE (2:1)	- NO
60.00	65.00 %	V	0007732185 ZC0110000 WATER	- NO
10.00	15.00 %	V	0010117381 POTASSIUM SULFITE	- NO
5.00	10.00 %	V	0021799871 BENZENESULFONIC ACID, 2,5-DIHYDROXY-, MONOPOTASSIUM SALT	- VOC

Total Qty Issued: 2.00

$C_6H_5KO_5S$
228.25 MW
→ per Langley MSDS
365838
Assume = wt %

6750012851770 SV02 STABILIZER,PHOTOGRA 8080532 CONSUMED IN USE BT

7B594 1 — 1 KODAK PROCESSING LABORATORY 1.00 95,100.00 STABILIZER, PHOTOGRAPHIC Y 07/19/1995

f = 1.331

4% VOC
0% HAP

0.00	1.00 %	V	0000100970 MN472500(HEXAMINE	- VOC
0.00	1.00 %	W	0002634335 DE4620000 1,2-BENZISOTHIAZOL-3(2H)-ONE	- VOC
95.00	100.00 %	V	0007732185 ZC0110000 WATER	- NO
0.00	1.00 %	V	0024938918 YD4571000 TRIDECANOL CONDENSED WITH 6 MOLES ETHYLENE OXIDE	- Yes VOC
0.00	1.00 %	W	0025155300 DB6825000 SODIUM DODECYLBENZENESULFONATE	Yes
0.00	1.00 %	V	0026099092 2-BUTENEDIOIC ACID (Z)-, HOMOPOLYMER	- NO

MSDS
0072449

Total Qty Issued: 8.00

6750013204809 MI01 REPLENISHER,DEVELOP INDUSTRIAL WASTE TREATMENT PLANT (IWTP; 1,369.00 ML BT

7B594 1 1 KODAK PROCESSING LABORATORY 1.04 95,100.00 REPLENISHER, DEVELOPER Y 07/19/1995

0.00	1.00 %	V	0000102716	KL9275000	TRIETHANOLAMINE	VOC ρ=1.126 = 1.08% wt
25.00	30.00 %	V	0000584087	TS7750000	POTASSIUM CARBONATE (2:1)	NO
1.00	5.00 %	V	0001310583	TT2100000	POTASSIUM,HYDROXIDE	NO
0.00	1.00 %	V	0002809214	SZ8562100	PHOSPHONIC ACID, (1-HYDROXYETHYLIDENE)DI-	NO
10.00	15.00 %	V	0003710847	NC3500000	DIETHYLHYDROXYLAMINE	VOC ρ=0.867 = 12.5% wt
1.00	5.00 %	V	0007447407	TS8050000	POTASSIUM CHLORIDE	NO
0.00	1.00 %	V	0007647145	VZ4725000	SODIUM CHLORIDE	NO
70.00	75.00 %	V	0007732185	ZC0110000	WATER	NO
1.00	5.00 %	V	0010117381		POTASSIUM SULFITE	NO
5.00	10.00 %	V	0010377487	OJ6419000	LITHIUM SULFATE (2:1)	NO
20.00	25.00 %	V	0025646713	PB0431000	METHANESULFONAMIDE, N-(2-(4-AMINO-N-ETHYL-M-TOLUIDINO)ETHYL)-, SULFATE (2:3)	VOC = __ % wt

Total Qty Issued: 8.00

6750013206637 SV02 STABILIZER,REP,10LI 8576023 CONSUMED IN USE 2.00 OZ BT

0.1% VOC
0% HAP

7B594 1 KODAK PROCESSING LABORATORY 1.02 95.00 STABILIZER, REPLENISHER Y 07/19/1995

0.00	0.10 %	W	0002634335	DE4620000	1,2-BENZISOTHIAZOL-3(2H)-ONE	VOC
90.00	95.00 %	V	0007732185	ZC0110000	WATER	NO
1.00	5.00 %	V	0009003398	TR8370000	POLY(1-VINYL-2-PYRROLIDINONE) HUEPER'S POLYMER NO.1	NO

Total Qty Issued: 16.00

6750013206638 MI01 BLEACH,FIX-N-REPLE 8209031 INDUSTRIAL WASTE TREATMENT PLANT (IWTP; 2.64 GL BT

10.3% VOC

7B594 1 1 KODAK PROCESSING LABORATORY 1.10 7,075.00 BLEACH, FIX AND REPLENISHER 08/16/1995

1.00	5.00 %	W	0000064197	AF1225000	ACETIC ACID	VOC ✓ ρ=1.0492 = 5% wt
1.00	5.00 %	V	0000631618	AF3675000	AMMONIUM ACETATE	VOC ρ=1.17 = 5.3% wt
5.00	10.00 %	V	0007631905	VZ2000000	SODIUM BISULFITE	NO
50.00	55.00 %	V	0007732185	ZC0110000	WATER	NO
35.00	40.00 %	V	0007783188	XN6465000	AMMONIUM THIOSULFATE	NO
1.00	5.00 %	V	0010196040	WT3505000	AMMONIUM SULFITE	NO
5.00	10.00 %	W	0021265509		FERRATE(1-), [[N,N'-1,2-ETHANEDIYLBIS[N-[(CARBOXY-.KAPPA.O)METHYL]GLYCINATO-.KAPPA.N,.KAPPA.O]](4-)]-, AMMONIUM, (OC-6-21)-	NO

Total Qty Issued: 17.00

6750013206638 SV02 BLEACH,FIX-N-REPLE CONSUMED IN USE 2.64 GL BT

10.3% VOC

7B594 1 KODAK PROCESSING LABORATORY 1.10 7,075.00 BLEACH, FIX AND REPLENISHER Y 08/16/1995

1.00	5.00 %	W	0000064197	AF1225000	ACETIC ACID	VOC ✓
1.00	5.00 %	V	0000631618	AF3675000	AMMONIUM ACETATE	VOC ρ=1.17
5.00	10.00 %	V	0007631905	VZ2000000	SODIUM BISULFITE	NO
50.00	55.00 %	V	0007732185	ZC0110000	WATER	NO
35.00	40.00 %	V	0007783188	XN6465000	AMMONIUM THIOSULFATE	NO
1.00	5.00 %	V	0010196040	WT3505000	AMMONIUM SULFITE	NO
5.00	10.00 %	W	0021265509		FERRATE(1-), [[N,N'-1,2-ETHANEDIYLBIS[N-[(CARBOXY-.KAPPA.O)METHYL]GLYCINATO-.KAPPA.N,.KAPPA.O]](4-)]-, AMMONIUM, (OC-6-21)-	NO

11.11

Total Qty Issued: 3.00

6750013282508 SV02 DEVELOPER, PHOTOGRAPHIC 8485153 CONSUMED IN USE 1.00 QT BT

19139 1 1 EASTMAN KODAK CO 1.23 7,075.00 848 5153 FLEXICOLOR DEVELOPER STARTER LORR Y 02/22/1995

1.00	5.00 %	V	0000140012	PENTETIC ACID, PENTASODIUM SALT	NO
10.00	15.00 %	V	0000298146	POTASSIUM BICARBONATE	NO

0% VOC
0% HAP

5.00	10.00 %	V	0000584087	TS7750000 POTASSIUM CARBONATE (2:1) NO
1.00	5.00 %	V	0007647156	VZ3150000 SODIUM BROMIDE NO
70.00	75.00 %	V	0007732185	ZC0110000 WATER NO
1.00	5.00 %	V	0007757837	WE215000(SODIUM SULFITE NO

Total Qty Issued: 2.00

6750013605171 SV02 BLEACH,PHOTOGRAPHIC,5 LITERS 8255549 CONSUMED IN USE 5.00 LI BT

7B594 1 1 KODAK PROCESSING LABORATORY 1.17 6,065.00 REPLENISHER, FLEXICOLOR, BLEACH Y 07/19/1995

5% VOC
0% HAP

1.00	5.00 %	V	0000064197	AF1225000 ACETIC ACID VOC = 5% W
1.00	5.00 %	V	0001939362	GLYCINE, N,N'-1,3-PROPANEDIYLBIS[N-(CARBOXYMETHYL)-
8.00	8.00 %	V	0006484522	BR9050000 AMMONIUM NITRATE – NO
60.00	65.00 %	V	0007732185	ZC0110000 WATER – NO
5.00	10.00 %	V	0012124979	BO9155000 AMMONIUM BROMIDE – NO
10.00	15.00 %	V	0111687366	FERRATE(1-), [[N,N'-1,3-PROPANEDIYLBIS[N-[(CARBOXY-.KAPPA.O)METHYL]GLYCINATO-.KAPPA.N,.KAPPA.O]](4-)]-, AMMONIUM, (OC-6-21)- – NO

Total Qty Issued: 4.00

6750013765890 SV02 LITERS,FIXING BATH,PHOTO,10 LITR 8218950 CONSUMED IN USE 5.00 LT BT

7B594 1 1 KODAK PROCESSING LABORATORY 1.11 7,075.00 821 8950 FLEXICOLOR RA FIXER AND REPLENISHER, WORKING SOLN Y 08/23/1995

0% VOC
0% HAP

20.00	25.00 %	V	0000556649	XL1575000 METHYL THIOCYANATE – NO
50.00	55.00 %	V	0007732185	ZC0110000 WATER – NO
1.00	5.00 %	V	0007757837	WE215000(SODIUM SULFITE – NO
15.00	20.00 %	V	0007783188	XN6465000 AMMONIUM THIOSULFATE – NO
1.00	5.00 %	V	0010196040	WT350500(AMMONIUM SULFITE – NO

Total Qty Issued: 10.00

6750013765892 SV02 DEVELOPER,PHOTOGRAPHIC,10 LI 812 1857 8121857 CONSUMED IN USE 10.00 LI BT

GK87F 1 1 EASTMAN KODAK COMPANY, EAST 1.39 6,575.00 812 1857 FLEXICOLOR DEVELOPER REPLENISHER LORR Y 06/13/1997

65.00	70.00 %	W	0007732185	ZC0110000 WATER NO

Total Qty Issued: 6.00

0% VOC
0% HAP

RAW DATA

SECTION 23 – SMALL ARMS FIRING

Small Arms Firing

Location	Types of rounds (e.g., 5.56 mm, 9 mm, 7.62 mm, etc.)	Number of rounds fired (1999)[1]	Amount of explosives per round (grains/round)	Control device [2]	Control Device make, model #, and manufacturer	Control Device rated efficiency	Quantity of lead styphnate contained in each round (grains/round)[1]
MAFB Range	5.56mm Ball	341,237rds	0.0041pounds		Action Target System Model #TC2	Satisfactory	unknown
	5.56mm Ball&Tracer	33,835rds	0.0077000pounds		Action Target System Model #TC2	Satisfactory	unknown
	7.62mm Ball&Tracer	183,837rds	0.0067000pounds		Action Target System Model #TC2	Unsatisfactory	unknown
	9mm Ball	48,935rds	0.0009010pounds		Action Target System Model #TC2	Satisfactory	unknown
	12 Gauge	3,970rds	0.0038000pounds		Action Target System Model #TC2	Satisfactory	unknown
	40mm TP	6,580rds	0.0008000pounds	None	N/A	N/A	None
	40mm TP Linked	7,725rds	0.0104000pounds	None	N/A	N/A	None

1. Values for 5.56 mm, 9 mm, and 7.62 mm ammunition are listed in the "Small Arms Firing" section. Values for other types of munitions can be obtained from the Army's "MIDAS" program]
2. Control device may exist as dry filters to control lead emissions from an indoor firing range, etc.

RAW DATA

SECTION 24 – SOLVENT CLEANING MACHINES

Malmstrom AFB, MT
Solvent Cleaning Units

Machine Type	Model Number	Location	Solvent(a)	Change Frequency (wks)	Gallons Quantity of solvent added in 1999	Quantity of solvent removed in 1999	
Hurri Washer	5315C Degreaser 85	Bldg 200	Safety-Kleen Premium Gold Solvent	~~52~~ 8	182	173	NON-HAZ
Safety Kleen	23 15C	Bldg 320	Safety-Kleen Premium Gold Solvent	16	36	36	HAZ
Safety Kleen	44 15C	Bldg 407	Safety-Kleen Premium Gold Solvent	8	210	136	HAZ
Smart Washer		Bldg 407	Safety-Kleen Premium Gold Solvent				
Hotsy		Bldg 450	Safety-Kleen Premium Gold Solvent				
Safety Kleen	23 15C	Bldg 685	Safety-Kleen Premium Gold Solvent	16	50	56	HAZ
Safety Kleen	23 15C	Bldg 850	Safety-Kleen Premium Gold Solvent	~~8~~ 16	36	36	HAZ
Safety Kleen	Immersion Cleaner	Bldg 850	Monoethanolamine	12	24	20	HAZ
Safety Kleen	34 15C	Bldg 870	SK Premium Gold	~~12~~ 8	182	173	HAZ
Safety Kleen	44 15C	Bldg 882	SK Premium Gold	4	455	433	NON-HAZ
Hercules Paint Gun Cleaner		Bldg 910	?				
Safety Kleen	1107	Bldg 910	Paint Gun Cleaner	8	35	35	HAZ
Safety Kleen	33 15C	Bldg 1222	SK Premium Gold	16	34	28	HAZ
Smart Washer		Bldg 1248	?				
Safety Kleen	34 15C	Bldg 1440	SK Premium Gold	8	182	175	NON-HAZ
Safety Kleen	34 15C	Bldg 1448	SK Premium Gold	8	182	195	NON-HAZ
Safety Kleen	23 15C	Bldg 1450	SK Premium Gold	16	12	13	NON-HAZ
Safety Kleen	1107	Bldg 3075	Paint Gun Cleaner	~~8~~ 4	65	65	HAZ
Smart Washer		Bldg 82110	?				
Safety Kleen	33 15C	Bldg 82110	Safety Kleen 15 Premium Gold	16	51	48	HAZ
Safety Kleen	26100 5115C	Bldg 1450 Bldg 970	SK Aqueous Cleaner SK Premium Gold	12 8	10 63	8 60	HAZ HAZ

Paint Thinner

Stephanie
Reynolds
513-825-7495

OzzyJuice®
(SW-1 Degreasing Solution)

MATERIAL SAFETY DATA SHEET

ChemFree Corporation
8 Meca Way
Norcross, GA 30093 USA
TEL: (770) 564-5580
FAX: (770) 564-5533
www.chemfree.com

HAZARD RATINGS		
HEALTH	1	0 = least 1 = slight
FLAMMABILITY	0	2 = moderate 3 = high
REACTIVITY	0	4 = extreme

IDENTITY : Degreasing Solution

SECTION I

MANUFACTURER'S NAME :	ChemFree Corporation
ADDRESS :	8 Meca Way Norcross, GA 30093 USA
24 HOUR EMERGENCY RESPONSE:	HEPACO (800)888-7689
DATE PREPARED :	September 8, 1999
PREPARED BY :	O.Ortiz

SECTION II
HAZARDOUS INGREDIENTS / INFORMATION

HAZARDOUS COMPONENTS: OSHA PEL - Not listed. ACGIH/TLV - Not listed. Other - None None as Defined by 29 CFR, 40 CFR or SARA TITLE III; this product is not a carcinogen or a potential carcinogen as Defined by OSHA, the NTP or the IAARC Monographs.
Proprietary surfactant blend.

SECTION III
PHYSICAL / CHEMICAL CHARACTERISTICS

APPEARANCE AND ODOR : Free-flowing liquid with a slight, pleasant aroma
BOILING POINT: 210° F/99° C
PH: 7.0
SPECIFIC GRAVITY: 1.0020
VAPOR DENSITY (Air=1): 3.55
SOLUBILITY IN WATER: Infinite

SECTION IV
FIRE & EXPLOSION HAZARD DATA

FLASH POINT :	None
METHOD USED :	Open cup
FLAMMABLE LIMITS :	
LEL :	N/A
UEL :	N/A
SPECIAL FIRE FIGHTING PROCEDURES :	None
USUAL FIRE & EXPLOSION HAZARDS :	None

SECTION V
REACTIVITY DATA

STABILITY :	Stable
HAZARDOUS POLYMERIZATION :	Will not occur

SECTION VI HEALTH HAZARD DATA

HEALTH HAZARDS (Acute & Chronic) :	None
CARCINOGENICITY :	
NTP :	Ingredients not listed
IARC MONOGRAPHS:	Ingredients not listed
OSHA REGULATED :	Ingredients not listed

EMERGENCY & FIRST AID PROCEDURES:

EYES: It is unlikely that emergency treatment will be required; if adverse effects occur, rinse eyes with large amounts of water until no evidence of chemical remains. Seek medical attention if necessary.

SKIN: It is unlikely that emergency treatment will be required; if adverse effects occur, rinse affected area with large amounts of water until no evidence of chemical remains. Seek medical attention if necessary.

INGESTION: It is unlikely that emergency treatment will be required; if adverse effects occur, treat symptomatically and seek medical attention if necessary.

INHALATION: It is unlikely that emergency treatment will be required; if adverse effects occur, remove to fresh air and observe. Seek medical attention if necessary.

SECTION VII
PRECAUTIONS FOR SAFE HANDLING

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED :

SPILLS :	Dilute with water and flush into sanitary sewer.
WASTE DISPOSAL METHOD :	Dilute with water and flush into sanitary sewer.
PRECAUTIONS TO BE TAKEN IN HANDLING & STORING:	Do not freeze. Keep container closed when not in use. Follow label instructions.
OTHER PRECAUTIONS :	Keep this and all chemicals out of the reach of small children.

SECTION VIII
CONTROL MEASURES

RESPIRATORY PROTECTION (Specify Type) :	Not required.
VENTILATION (Local exhaust) :	Not required.
PROTECTIVE GLOVES :	It is recommended that rubber gloves be worn when handling any industrial-use products.
EYE PROTECTION :	It is recommended that safety glasses be worn when handling any industrial-use products.
OTHER / HYGIENIC PRACTICES :	Always use good housekeeping procedures when using any chemical product.

SECTION IX
ADDITIONAL INFORMATION

BIODEGRADABILITY :	Biodegradable
WASTE DISPOSAL METHODS :	Not required
DOT Class :	Not required
DOT Identification Number :	Not required

SARA TITLE III REPORTING REQUIREMENTS

SECTION 302 - EXTREMELY HAZARDOUS SUBSTANCES	Reporting not required.
SECTION 304 - HAZARDOUS RELEASES	Reporting not required.
SECTION 311 - COMMUNITY RIGHT-TO-KNOW (RKK)	Reporting not required.
SECTION 312 - R-T-K INVENTORY DATA	Reporting not required.
SECTION 313 - EMISSIONS AND RELEASE	Reporting not required.

REFERENCES

PERMISSIBLE EXPOSURE REFERENCES :
- Registry of Toxic Effects of Chemical Substances
- Title 29 Code of Federal Regulations
- National Toxicology Program (NTP) Report on Carcinogens
- International Agency for Research on Cancer (IARC) Monographs

REGULATORY STANDARDS :
- DOT Title 49 Code of Federal Regulations 172.101
- SARA Title III

TRNSNO	DISPDT	WSTRM	SQUADRON	OFFSYM	BLDG	WTLBS	TYPEWST	SHIPNAME	EPAHZCDS	FUNDYEAR	LABCOST	CONTR_PR	RANSP_EPA_NU	ORIG_EPA
1999252501	1999252	SK0001	341 SVS	SVRO	1222	80	SAFETY-KLEEN	COMBUSTIBLE	D039	1999	$0.00		NDD980957070	MT8571924556
1999056503	1999056	SK0001	341 SVS	SVRO	1222	107	SAFETY-KLEEN	COMBUSTIBLE	D039	1999	$0.00		NDD980957070	MT8571924556
1999056500	1999056	SK0001	341 CES	CEOHH	210	201	SAFETY-KLEEN	Combustible	D039	1999	$0.00		NDD980957070	MT8571924556
1999112500	1999112	SK0001	341 CES	CEOHH	210	161	SAFETY-KLEEN	COMBUSTIBLE	D039	1999	$0.00		NDD980957070	MT8571924556
1999196502	1999196	SK0001	341 MXS	LGMDC	3075	36	SAFETY-KLEEN	RELATED	D035 D039	1999	$0.00		NDD980957070	MT8571924556
1999252503	1999252	SK0001	341 MXS	LGMDC	3075	36	SAFETY-KLEEN	RELATED	D035 D039	1999	$0.00		NDD980957070	MT8571924556
1999224503	1999224	SK0001	341 MXS	LGMDC	3075	36	SAFETY-KLEEN	RELATED	D035 D039	1999	$0.00		NDD980957070	MT8571924556
1999056504	1999056	SK0001	341 MXS	LGMDC	3075	36	SAFETY-KLEEN	RELATED	D035 D039	1999	$0.00		NDD980957070	MT8571924556
1999028502	1999028	SK0001	341 MXS	LGMDC	3075	36	SAFETY-KLEEN	RELATED	D035 D039	1999	$0.00		NDD980957070	MT8571924556
1999140503	1999140	SK0001	341 MXS	LGMDC	3075	36	SAFETY-KLEEN	RELATED	D035 D039	1999	$0.00		NDD980957070	MT8571924556
1999084502	1999084	SK0001	341 MXS	LGMDC	3075	36	SAFETY-KLEEN	RELATED	D035 D039	1999	$0.00		NDD980957070	MT8571924556
1999112502	1999112	SK0001	341 MXS	LGMDC	3075	36	SAFETY-KLEEN	RELATED	D035 D039	1999	$0.00		ILD984908202	MT8571924556
1999168503	1999168	SK0001	341 MXS	LGMDC	3075	36	SAFETY-KLEEN	RELATED	D035 D039	1999	$0.00		NDD980957070	MT8571924556
1999168500	1999168	SK0001	341 CES	CEOHH	407	214	SAFETY-KLEEN	COMBUSTIBLE	D039	1999	$0.00		NDD980957070	MT8571924556
1999224500	1999224	SK0001	341 CES	CEOHH	407	228	SAFETY-KLEEN	COMBUSTIBLE	D039	1999	$0.00		NDD980957070	MT8571924556
1999084500	1999084	SK0001	341 TRNS	LGTM	450	80	SAFETY-KLEEN	COMBUSTIBLE	D039	1999	$0.00		NDD980957070	MT8571924556
1999196500	1999196	SK0001	341 TRNS	LGTM	450	80	SAFETY-KLEEN	COMBUSTIBLE	D039	1999	$0.00		NDD980957070	MT8571924556
1999168502	1999168	SK0001	AFFES	SER STA	685	87	SAFETY-KLEEN	COMBUSTIBLE	D039	1999	$0.00		NDD980957070	MT8571924556
1999140502	1999140	SK0001	AFFES	SER STA	685	121	SAFETY-KLEEN	COMBUSTIBLE	D039	1999	$0.00		NDD980957070	MT8571924556
1999028501	1999028	SK0001	AFFES	BX	685	80	SAFETY-KLEEN	COMBUSTIBLE	D039	1999	$0.00		NDD980957070	MT8571924556
1999252502	1999252	SK0001	AFFES	BX	685	87	SAFETY-KLEEN	COMBUSTIBLE	D039	1999	$0.00		NDD980957070	MT8571924556
1999168501	1999168	SK0001	341 CES	CEOIP	82110	107	SAFETY-KLEEN	COMBUSTIBLE	D039	1999	$0.00		NDD980957070	MT8571924556
1999056501	1999056	SK0001	341 CES	CEOIP	82110	107	SAFETY-KLEEN	COMBUSTIBLE	D039	1999	$0.00		NDD980957070	MT8571924556
1999112501	1999112	SK0001	341 TRNS	LGTM	850	80	SAFETY-KLEEN	COMBUSTIBLE	D039	1999	$0.00		NDD980957070	MT8571924556
1999056502	1999056	SK0001	341 TRNS	LGTM	850	39	SAFETY-KLEEN	COMPOUNDS,	D027 D039	1999	$0.00		NDD980957070	MT8571924556
1999140500	1999140	SK0001	341 TRNS	LGTM	850	40	SAFETY-KLEEN	Compunds,	D027 D039	1999	$0.00		NDD980957070	MT8571924556
1999224501	1999224	SK0001	341 TRNS	LGTM	850	74	SAFETY-KLEEN	COMBUSTIBLE	D039	1999	$0.00		NDD980957070	MT8571924556
1999224502	1999224	SK0001	341 TRNS	LGTM	850	40	SAFETY-KLEEN	COMPOUNDS,	D027 D039	1999	$0.00		NDD980957070	MT8571924556
1999028500	1999028	SK0001	341 TRNS	LGTM	870	227	SAFETY-KLEEN	COMBUSTIBLE	D039	1999	$0.00		NDD980957070	MT8571924556
1999196501	1999196	SK0001	341 TRNS	LGTM	870	228	SAFETY-KLEEN	COMBUSTIBLE	D039	1999	$0.00		NDD980957070	MT8571924556
1999084501	1999084	SK0001	341 TRNS	LGTM	870	221	SAFETY-KLEEN	COMBUSTIBLE	D039	1999	$0.00		NDD980957070	MT8571924556
1999252500	1999252	SK0001	341 TRNS	LGTM	870	221	SAFETY-KLEEN	COMBUSTIBLE	D039	1999	$0.00		NDD980957070	MT8571924556
1999140501	1999140	SK0001	341 TRNS	LGTM	870	168	SAFETY-KLEEN	COMBUSTIBLE	D039	1999	$0.00		NDD980957070	MT8571924556
1999028503	1999028	SK0001	341 TRNS	LGTM	920	36	SAFETY-KLEEN	RELATED	D035 D039	1999	$0.00		NDD980957070	MT8571924556
1999252504	1999252	SK0001	341 TRNS	LGTM	920	36	SAFETY-KLEEN	RELATED	D035 D039	1999	$0.00		NDD980957070	MT8571924556
1999140504	1999140	SK0001	341 TRNS	LGTM	920	36	SAFETY-KLEEN	RELATED	D035 D039	1999	$0.00		NDD980957070	MT8571924556
1999084503	1999084	SK0001	341 TRNS	LGTM	920	36	SAFETY-KLEEN	RELATED	D035 D039	1999	$0.00		NDD980957070	MT8571924556
1999196503	1999196	SK0001	341 TRNS	LGTM	920	36	SAFETY-KLEEN	RELATED	D035 D039	1999	$0.00		SCD987574647	MT8571924556

BASE CONTACT:

MR. JIM MORRIS @6440 (B.1708)

Date Run: 6/20/00

AF FORM 2761 - HAZARDOUS MATERIAL USE

Command: AFSPC Orgn: 341 TRNS Office: LGTMAT BES-WPID: 00124-TRAT-056A Shop Code: 424BS Orgn Title: BODY SHOP (ALLIED TRADES)
Bldg: 910 Shop Location: RM N/A DLVD 870 Supv Name: TSGT RANDALL R. KEIRN Phone No.: (634) 4 - CSA Id: 99

NSN / Cage	Proc Code / Ver	Comp	Noun / Manufacturer's Name	Amt Min	Amt Max	Conc	% By	CAS	Specification / NIOSH	Part Number/Trade Name / Chemical Name	Disposal Method	INH	ABS	Unit Size / MSDS ING	UI / MSDS CON	Unit / Pkg Date
				10.00	20.00	%	W	0007727437		BARIUM SULFATE						
				10.00	20.00	%	W	0013463677	XR2275000	TITANIUM DIOXIDE		Y	N	N	N	
				0.10	1.00	%	W	0014808607	VV7330000	QUARTZ (SIO2)		Y			Y	
				1.00	5.00	%	W	0025036253		BISPHENOL A EPON 829 POLYMER						
Total Qty Issu 1.00																
3010PDRR1160	PA08		PAINT, THINNER						DRR1160		CONSUMED IN USE			1.00	GL	
47695	1	1	PPG INDUSTRIES INC							PAINT, THINNER				Y	6/30/90	
				35.00	40.00	%	W	0000067641	AL3150000	ACETONE		Y	N	Y	Y	
				10.00	15.00	%	W	0000108656	AI8925000	1-METHOXY-2-PROPANOL ACETATE						
				5.00	10.00	%	W	0000108883	XS5250000	TOLUENE		Y	Y	Y	Y	
				10.00	15.00	%	W	0000110190	AI4025000	ISO-BUTYL ACETATE		Y	N	Y	Y	
				1.00	2.00	%	W	0000123864	AF7350000	BUTYL ACETATE		Y	N	Y	Y	
				2.00	5.00	%	W	0000763699		ETHYL-B-ETHOXYPROPIONATE						
				5.00	10.00	%	W	0001330207	ZE2100000	XYLENE (MIXED ISOMERS) (SEE ALSO CAS NUM: 954		Y	Y	Y	Y	
				15.00	20.00	%	W	0064742898		PETROLEUM SOLVENT						
Total Qty Issu 1.00																
010PDT895	PA08		REDUCER						DT895		CONSUMED IN USE			1.00	GL	CN
24083	1	1	PPG INDUSTRIES INC COATINGS AND RESINS DIV							DT895				Y	8/16/95	
				10.00	15.00	%	W	0000078933	EL6475000	METHYL ETHYL KETONE		Y	N	Y	Y	
				10.00	15.00	%	W	0000108883	XS5250000	TOLUENE		Y	Y	Y	Y	
				10.00	15.00	%	W	0000123864	AF7350000	BUTYL ACETATE		Y	N	Y	Y	
				35.00	40.00	%	W	0000763699		ETHYL-B-ETHOXYPROPIONATE						
				5.00	10.00	%	W	0001330207	ZE2100000	XYLENE (MIXED ISOMERS) (SEE ALSO CAS NUM: 954		Y	Y	Y	Y	
				25.00	30.00	%	W	0064742898		PETROLEUM SOLVENT						
Total Qty Issu 3.00																
010PDTL10	PA08		LACQUER THINNER						DTL10		CONSUMED IN USE			16.00	GL	CN
			Used at Hercules Gun Cleaner													
93915	1	1	PPG IND COATINGS/RESIN/RESEARCH DEV							DTL REDUCERS				Y	3/18/92	
				30.00	35.00	%	W	0000067641	AL3150000	ACETONE		Y	N	Y	Y	
				5.00	10.00	%	W	0000123864	AF7350000	BUTYL ACETATE		Y	N	Y	Y	
				1.00	2.00	%	W	0025265774		2-METHYLPROPANOIC ACID, MONESTER W/2,2,4-TRIM						
				25.00	30.00	%	W	0064742898		PETROLEUM SOLVENT						

AF FORM 2761*- HAZARDOUS MATERIAL USE

Command: AFSPC Orgn: 341 TRNS Office: LGTMAT BES-WPID: 00124-TRAT-056A Shop Code: 424BS Orgn Title: BODY SHOP (ALLIED TRADES)
Bldg: 910 Shop Location: RM N/A DLVD 870 Supv Name: TSGT RANDALL R. KEIRN Phone No.: (634) 4 - CSA id: 99

NSN / Cage	Proc Code / Ver	Noun / Comp / Amt Min	Manufacturer's Name / Amt Max	Conc	% By	CAS	Specification / NIOSH	Part Number/Trade Name / Chemical Name	Disposal Method	INH	ABS	Unit Size / MSDS ING	UI Unit / MSDS CON	Pkg Date
		2.00	5.00	%	W	0064742956		SOLVENT NAPHTHA,LIGHT AROMATIC (C8-10)						
Total Qty Issu 2.00														
010PDTL16	PA08	LACQUER THINNER					DTL16		CONSUMED IN USE			5.00	GL	DR
24083	1	1	PPG INDUSTRIES INC COATINGS AND RESINS DIV					ALL PURPOSE THINNER				Y	11/10/87	
			400.00	B		0000067630	NT8050000	ISOPROPYL ALCOHOL (MANUFACTURED BY STRONG		Y	N	Y	Y	
			750.00	B		0000067641	AL3150000	ACETONE		Y	N	Y	Y	
				U		0000108656	AI8925000	1-METHOXY-2-PROPANOL ACETATE						
			100.00	B		0000108883	XS5250000	TOLUENE		Y	Y	Y	Y	
			100.00	B		0001330207	ZE2100000	XYLENE (MIXED ISOMERS) {SEE ALSO CAS NUM: 9547		Y	Y	Y	Y	
				U		0064742898		PETROLEUM SOLVENT						
Total Qty Issu 9.00														
)10PDTR601	PA08	PAINT, ENAMEL, REDUCER					DTR601		CONSUMED IN USE			1.00	GL	CN
47695	1	1	PPG INDUSTRIES INC					PAINT, ENAMEL, REDUCER				Y	11/10/87	
		20.00	•20.00	%	W	0000067641	AL3150000	ACETONE		Y	N	Y	Y	
		25.00	25.00	%	W	0000108883	XS5250000	TOLUENE		Y	Y	Y	Y	
		45.00	45.00	%	W	0008030306	QI9450000	NAPHTHA		Y	N	N	N	
Total Qty Issu 2.00														
)10PDTR602	PA08	PAINT, ENAMEL, REDUCER					DTR602		CONSUMED IN USE			1.00	GL	CN
47695	1	1	PPG INDUSTRIES INC					PAINT, ENAMEL, REDUCER				Y	3/30/9	
		10.00	15.00	%	W	0000067641	AL3150000	ACETONE		Y	N	Y	Y	
		25.00	30.00	%	W	0000108883	XS5250000	TOLUENE		Y	Y	Y	Y	
		2.00	5.00	%	W	0025265774		2-METHYLPROPANOIC ACID, MONESTER W/2,2,4-TRIM						
		30.00	35.00	%	W	0064742898		PETROLEUM SOLVENT						
		10.00	15.00	%	W	0064742945		HEAVY AROMATIC SOLVENT NAPHTHA (PETROLUEM						
		10.00	15.00	%	W	0064742956		SOLVENT NAPHTHA,LIGHT AROMATIC (C8-10)						
Total Qty Issu 2.00														
)10PDU5	AD07	URETHANE HARDENER				1.01	DU5 57 53.6%		CONSUMED IN USE			1.00	GL	CN
47695	1	1	PPG INDUSTRIES INC					URETHANE HARDENER				Y	9/10/96	
		30.00	40.00	%	W	0000123864	AF7350000	BUTYL ACETATE		Y	N	Y	Y	
		0.10	1.00	%	W	0004098719	NQ9370000	ISOPHORONE DIISOCYANATE		Y	N	N	Y	
		30.00	40.00	%	W	0028182812		HEXANETHYLENEDIISOCYANATE POLYMER						

SAFETY-KLEEN PREMIUM GOLD SOLVENT

MATERIAL SAFETY DATA SHEET FOR USA AND CANADA

SECTION 1: CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: **SAFETY-KLEEN PREMIUM GOLD SOLVENT**

SYNONYMS: (Also known as SAFETY-KLEEN PREMIUM GOLD SOLVENT - CALIF. and SAFETY-KLEEN PREMIUM SOLVENT.) Parts Washer Solvent; Petroleum Distillates; Petroleum Naphtha; Naphtha, Solvent; Stoddard Solvent; Mineral Spirits.

PRODUCT PART NUMBERS: (Also known as 6639.) 6638.

PRODUCT USE: Cleaning and degreasing metal parts.
If this product is used in combination with other chemicals, refer to the Material Safety Data Sheets for those chemicals.

24-HOUR EMERGENCY TELEPHONES

	MEDICAL:	TRANSPORTATION (SPILL):
These numbers are for emergency use only. If you desire non-emergency information about this product, please call a telephone number listed below.	1-800-752-7869 (USA) Extension 2	1-800-468-1760 (USA)
	1-312-942-5969 (CANADA)	1-613-996-6666 (CANADA)

MANUFACTURER/SUPPLIER: Safety-Kleen Corp.
1000 North Randall Road
Elgin, IL, 60123-7857 USA
1-800-669-5740

TECHNICAL INFORMATION: **1-800-669-5740 Extension 7500**

MSDS FORM NUMBER: 82658 (also formerly 82657) **ISSUE:** April 4, 1997

ORIGINAL ISSUE: January 26, 1995 **SUPERSEDES:** September 18, 1996

PREPARED BY: Product MSDS Coordinator **APPROVED BY:** MSDS Task Force

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Individuals with pre-existing lung, cardiac, central nervous system, or skin disorders may have increased susceptibility to the effects of exposure.

CHRONIC: Prolonged or repeated inhalation may cause toxic effects. Prolonged or repeated eye contact may cause inflammation of the membrane lining the eyelids and covering the eyeball. Prolonged or repeated skin contact may cause drying, cracking, redness, itching, swelling, or burns.

CANCER INFORMATION: No known carcinogenicity. For more information, see **SECTION 11: CARCINOGENCITY**.

Also see **SECTION 15: CALIFORNIA**.

SECTION 4: FIRST AID MEASURES

INHALATION: (BREATHING) Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Someone should stay with victim. Get medical attention if breathing difficulty persists.

EYES: For direct contact, immediately flush eyes with plenty of water, holding eyelids apart, for 15 minutes. If irritation or redness from exposure to vapor or mist develops, move away from exposure into fresh air. Get medical attention if irritation or pain persists.

SKIN: Remove contaminated clothing and shoes. Wash skin thoroughly with soap and water. Get medical attention if irritation or pain persists.

INGESTION: (SWALLOWING) Immediately get medical attention. Do NOT induce vomiting. If spontaneous vomiting occurs, keep head below hips to avoid breathing material into the lungs.

NOTE TO PHYSICIANS: No specific antidote available. Treat symptomatically and supportively. Administration of gastric lavage, if warranted, should be performed by qualified medical personnel. Call medical emergency telephone number (see **SECTION 1**) for additional information.

SECTION 5: FIRE FIGHTING MEASURES

FLASH POINT: 148°F (64°C) Tag Closed Cup (minimum)

FLAMMABLE LIMITS IN AIR: **LOWER:** 0.5 VOL% (minimum)
UPPER: 9.3 VOL% (maximum)

AUTOIGNITION TEMPERATURE: 440°F (227°C) (minimum)

HAZARDOUS COMBUSTION PRODUCTS: Burning may produce carbon monoxide.

CONDITIONS OF FLAMMABILITY: Heat, sparks, or flame.

SECTION 7: HANDLING AND STORAGE

HANDLING: Keep away from heat, sparks, or flame. Where explosive mixtures may be present, equipment safe for such locations should be used. Use clean, non-sparking tools and explosion-proof equipment. When transferring material, metal containers, including trucks and tank cars, should be grounded and bonded. Avoid contact with eyes, skin, clothing, and shoes. Use in well ventilated area. Do not breathe vapor or mist.

SHIPPING AND STORING: Keep container tightly closed when not in use and during transport. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose containers to heat, flame, sparks, static electricity, or other sources of ignition; containers may explode and cause injury or death. Empty product containers may retain product residue and can be dangerous. See **SECTION 14: TRANSPORT INFORMATION** for Packing Group information.

PERSONAL HYGIENE: Use good personal hygiene. Wash thoroughly with soap and water after handling and before eating, drinking, or using tobacco products. Clean contaminated clothing, shoes, and protective equipment before reuse. Discard contaminated clothing, shoes, or protective equipment if they cannot be thoroughly cleaned.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS: Provide general ventilation needed to maintain concentration of vapor or mist below applicable exposure limit. Where adequate general ventilation is unavailable, use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limit. Where explosive mixtures may be present, equipment safe for such locations should be used.

PERSONAL PROTECTIVE EQUIPMENT

RESPIRATORY PROTECTION: Use NIOSH/MSHA-approved respiratory protective equipment when concentration of vapor or mist exceeds applicable exposure limit. A self-contained breathing apparatus (SCBA) and full protective equipment are required for large spills or fire emergencies. Selection and use of respiratory protective equipment should be in accordance in the USA with OSHA General Industry Standard 29 CFR 1910.134; or in Canada with CSA Standard Z94.4-M1982.

EYE PROTECTION: Where eye contact is likely, wear chemical goggles; contact lens use is not recommended.

SKIN PROTECTION: Where skin contact is likely, wear nitrile, Viton®, or equivalent protective gloves; use of butyl rubber, natural rubber, or equivalent gloves is not recommended.

CARCINOGENICITY: IARC classifies chemicals by their carcinogenic risk, including agents that are known, probable, or possible carcinogens. NTP classifies chemicals as either known carcinogens, or for which there is limited evidence of carcinogenicity in humans or sufficient evidence of carcinogenicity in experimental animals. ACGIH recognizes several categories of carcinogens, including confirmed human carcinogens and suspected human carcinogens.

Based on best current information, there is no known carcinogenicity associated with these materials.

Also see **SECTION 15: CALIFORNIA.**

REPRODUCTIVE TOXICITY: Based on best current information, there is no known reproductive toxicity associated with these materials.

Also see **SECTION 15: CALIFORNIA.**

TERATOGENICITY: Based on best current information, there is no known teratogenicity associated with these materials.

MUTAGENICITY: Based on best current information, there is no known mutagenicity associated with these materials.

TOXICOLOGICALLY SYNERGISTIC PRODUCT(S): Based on best current information, there are no known toxicologically synergistic products associated with these materials.

SECTION 12: ECOLOGICAL INFORMATION

ECOTOXICITY: A Static Acute Bioassay as per the California Department of Fish and Game WPCL, was done using fathead minnows, and up to 750 ppm of the products in water.

The material passed the bioassay with only 1 out of 10 minnows dying. To fail the bioassay, more than 40% of the fish would die in 750 ppm.

OCTANOL/WATER PARTITION COEFFICIENT: Not available.

VOLATILE ORGANIC COMPOUNDS: 100 WT%; 6.5 to 6.8 lb/US gal; 780 to 820 g/l
Photochemically reactive as per 40 CFR Part 51.100(s).

SECTION 13: DISPOSAL CONSIDERATIONS

DISPOSAL: Dispose in accordance with federal, state, provincial, and local regulations. Regulations may also apply to empty containers. The responsibility for proper waste disposal lies with the owner of the waste. Contact Safety-Kleen regarding recycling or proper disposal.

Our testing of these products indicates that this compound is not always detectable. However, when detected, the toluene level is at or below 500 mg/l.

CANADIAN REGULATIONS

These products have been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS:	B3, D2B
CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA):	All the components of these products are listed on the Canadian Domestic Substances List.

SECTION 16: OTHER INFORMATION

REVISION INFORMATION:	New format.
LABEL/OTHER INFORMATION:	These products are Underwriters Laboratories (UL) listed.

User assumes all risks incident to the use of this product. To the best of our knowledge, the information contained herein is accurate. However, Safety-Kleen assumes no liability whatsoever for the accuracy or completeness of the information contained herein. No representations or warranties, either expressed or implied, or merchantability, fitness for a particular purpose or of any other nature are made hereunder with respect to information or the product to which information refers. The data contained on this sheet apply to the material as supplied to the user.

Solvent

Safety Kleen Pickups 1999

Building	Barrel Number	position D	Weight	Disposal Method	Type of Waste	Building	Squadron	ffice Symbol
1440	1999355503		191	Non-RCRA	SAFETY-KLEEN	1440	40 RQF	LGM
		total	191					
1450	1999280502	1999280	34	RCRA	SAFETY-KLEEN	1450	819RHS	LGTM
1450	1999355502		33	Non-RCRA	SAFETY-KLEEN	1450	819RHS	
		Total	67					
200	1999355500		208	Non-RCRA	SAFETY-KLEEN	200	341 CES	CEOIG
		Total	208					
3075	1999336502	1999336	36	RCRA	SAFETY-KLEEN	3075	341 MXS	LGMDC
3075	1999280503	1999280	36	RCRA	SAFETY-KLEEN	3075	341 MXS	LGMDC
3075	1999306501	1999306	36	RCRA	SAFETY-KLEEN	3075	341 MXS	LGMDC
		Total	108					
407	1999280500	1999280	228	RCRA	SAFETY-KLEEN	407	341 CES	CEOHH
407	1999336500	1999335	214	Non-RCRA	SAFETY-KLEEN	407	341 CES	CEOHH
		Total	442					
82110	1999280501	1999280	107	RCRA	SAFETY-KLEEN	82110	341 CES	CEOIP
		Total	107					
870	1999306500		40	RCRA	SAFETY-KLEEN	870	TRNS	LGTM
870	1999355505		221	Non-RCRA	SAFETY-KLEEN	870	TRNS	LGTM
		Total	261					
882	1999355501		274	Non-RCRA	SAFETY-KLEEN	882	TRNS	LGTM
		Total	274					
~~920~~ 10	1999355508		36	RCRA	SAFETY-KLEEN	920	TRNS	LGTM
920 10	1999306502	1999306	36	RCRA	SAFETY-KLEEN	920	TRNS	LGTM
		Total	72					

moved FROM 920 to 910

Malmstrom Parts/Paint Gun Cleaning Machines

MalmNumber	1
AccountNumber	1183032347
MachineNumber	10133
ModelNumber	Degreaser 85
Machine Name	Hurri Washer
SolventType	Petroleum Naphtha
SolventDensity	6.7
Length	36
Width	36
depth	48
HoursUsedDaily	1
DaysUsedWeekly	5
WeeksUsedYearly	52
Location	200
Squadron	341 CES
Office Symbol	CEOIG
FunctionName	Power Production
Contact_FirstName	Jimmy
Contact_LastName	Chestnutt
Contact_PhoneNu	6124
MachineChangeFr	52
EstCostPerService	$135.00
Company_Characte	Non RCRA Haz
Hazardous	No
AF Owned	Yes

Serviced by Safety Kleen
Not Safety Kleen machine

MalmNumber	2
AccountNumber	1183032498
MachineNumber	23057098
ModelNumber	23
Machine Name	Safety Kleen
SolventType	Petroleum Naptha
SolventDensity	6.7
Length	36
Width	24
depth	12
HoursUsedDaily	1
DaysUsedWeekly	5
WeeksUsedYearly	52
Location	320
Squadron	341 TRANS
Office Symbol	LGTM
FunctionName	Refueling Maintenance
Contact_FirstName	
Contact_LastName	Howard
Contact_PhoneNu	6435
MachineChangeFr	16
EstCostPerService	$148.00
Company_Characte	
Hazardous	No
AF Owned	No

MalmNumber	3
AccountNumber	1183032338
MachineNumber	44106031
ModelNumber	44
Machine Name	Safety Kleen
SolventType	Petroleum Naphtha
SolventDensity	6.7
Length	48
Width	36
depth	24
HoursUsedDaily	
DaysUsedWeekly	
WeeksUsedYearly	
Location	407
Squadron	341 CES
Office Symbol	CEOHH
FunctionName	Horizontal Construction
Contact_FirstName	Steve
Contact_LastName	Martin
Contact_PhoneNu	6462
MachineChangeFr	8
EstCostPerService	$233.00
Company_Characte	D039
Hazardous	Yes
AF Owned	No

MalmNumber	4
AccountNumber	
MachineNumber	
ModelNumber	
Machine Name	Smart Washer
SolventType	
SolventDensity	
Length	
Width	
depth	
HoursUsedDaily	
DaysUsedWeekly	
WeeksUsedYearly	
Location	407
Squadron	341 CES
Office Symbol	CEOHH
FunctionName	Horizontal Construction
Contact_FirstName	Steve
Contact_LastName	Martin
Contact_PhoneNu	6462
MachineChangeFr	
EstCostPerService	
Company_Characte	
Hazardous	No
AF Owned	Yes

442 LBS Disposed 1999

MalmNumber	5
AccountNumber	0
MachineNumber	0
ModelNumber	
Machine Name	Hotsy
SolventType	
SolventDensity	
Length	36
Width	36
depth	24
HoursUsedDaily	
DaysUsedWeekly	
WeeksUsedYearly	
Location	450
Squadron	341 MXS
Office Symbol	LGMSG
FunctionName	AGE
Contact_FirstName	MSgt
Contact_LastName	Cumming
Contact_PhoneNu	3309
MachineChangeFr	
EstCostPerService	$0.00
Company_Characte	
Hazardous	No
AF Owned	Yes

MalmNumber	6
AccountNumber	1183033236
MachineNumber	23057099
ModelNumber	23
Machine Name	Safety Kleen
SolventType	Petroleum Naphtha
SolventDensity	6.7
Length	36
Width	24
depth	12
HoursUsedDaily	0
DaysUsedWeekly	5
WeeksUsedYearly	52
Location	685
Squadron	341 SVS
Office Symbol	AFFES
FunctionName	BX Service Station
Contact_FirstName	
Contact_LastName	Clark
Contact_PhoneNu	452-4903
MachineChangeFr	16
EstCostPerService	$207.00
Company_Characte	D039
Hazardous	Yes
AF Owned	No

MalmNumber	7
AccountNumber	1183032496
MachineNumber	11058998
ModelNumber	23
Machine Name	Safety Kleen
SolventType	Petroleum Naptha
SolventDensity	6.7
Length	48
Width	36
depth	24
HoursUsedDaily	1
DaysUsedWeekly	5
WeeksUsedYearly	52
Location	850
Squadron	341 TRANS
Office Symbol	LGTM
FunctionName	Tire Shop
Contact_FirstName	MSgt
Contact_LastName	McPherson
Contact_PhoneNu	6303
MachineChangeFr	8
EstCostPerService	$164.00
Company_Characte	D039
Hazardous	Yes
AF Owned	No

MalmNumber	10
AccountNumber	1183032473
MachineNumber	
ModelNumber	44
Machine Name	Safety Kleen
SolventType	Petroleum Naptha
SolventDensity	6.7
Length	45
Width	24
depth	24
HoursUsedDaily	1
DaysUsedWeekly	5
WeeksUsedYearly	52
Location	882
Squadron	341 TRANS
Office Symbol	LGTM
FunctionName	Heavy Equipment
Contact_FirstName	MSgt
Contact_LastName	McPherson
Contact_PhoneNu	6335
MachineChangeFr	4
EstCostPerService	$203.00
Company_Characte	NON RCRA HAZ
Hazardous	No
AF Owned	No

274 LBS disposed 1999

MalmNumber	11
AccountNumber	0
MachineNumber	0
ModelNumber	
Machine Name	Hercules Paint Gun Cleaner
SolventType	
SolventDensity	0
Length	0
Width	0
depth	0
HoursUsedDaily	0
DaysUsedWeekly	0
WeeksUsedYearly	0
Location	910
Squadron	341 TRANS
Office Symbol	LGTM
FunctionName	Paint Shop
Contact_FirstName	TSgt
Contact_LastName	Kern
Contact_PhoneNu	6344
MachineChangeFr	0
EstCostPerService	$0.00
Company_Characte	
Hazardous	Yes
AF Owned	Yes

MalmNumber	12
AccountNumber	1183036040
MachineNumber	707702927
ModelNumber	1107
Machine Name	Safety Kleen
SolventType	Paint Gun Cleaner
SolventDensity	
Length	0
Width	0
depth	
HoursUsedDaily	0
DaysUsedWeekly	0
WeeksUsedYearly	0
Location	910
Squadron	341 TRANS
Office Symbol	LGTM
FunctionName	Paint Shop
Contact_FirstName	TSgt
Contact_LastName	Kern
Contact_PhoneNu	6344
MachineChangeFr	8
EstCostPerService	$208.00
Company_Characte	F005 F003 D001 D018 D035 D
Hazardous	Yes
AF Owned	No

72 LBS
disposed 1999

MalmNumber	13
AccountNumber	1183032702
MachineNumber	33052858
ModelNumber	33
Machine Name	Safety Kleen
SolventType	Petroleum Naptha
SolventDensity	6.7
Length	36
Width	24
depth	12
HoursUsedDaily	0.1
DaysUsedWeekly	5
WeeksUsedYearly	52
Location	1222
Squadron	341 SVS
Office Symbol	SVRO
FunctionName	Recreation Services
Contact_FirstName	
Contact_LastName	Turner
Contact_PhoneNu	4202
MachineChangeFr	16
EstCostPerService	$207.00
Company_Characte	D039
Hazardous	Yes
AF Owned	No

MalmNumber	14
AccountNumber	
MachineNumber	9496
ModelNumber	0
Machine Name	Smart Washer
SolventType	
SolventDensity	
Length	0
Width	0
depth	0
HoursUsedDaily	0
DaysUsedWeekly	0
WeeksUsedYearly	0
Location	1248
Squadron	341 SVS
Office Symbol	SVRSV
FunctionName	Auto Skills Center
Contact_FirstName	Jim
Contact_LastName	Heisler
Contact_PhoneNu	3319
MachineChangeFr	0
EstCostPerService	$0.00
Company_Characte	
Hazardous	No
AF Owned	Yes

MalmNumber	15
AccountNumber	1183032499
MachineNumber	34103641
ModelNumber	34R
Machine Name	Safety Kleen
SolventType	Petroleum Napth
SolventDensity	6.7
Length	36
Width	24
depth	24
HoursUsedDaily	
DaysUsedWeekly	
WeeksUsedYearly	
Location	1440
Squadron	40 RQF
Office Symbol	LGM
FunctionName	Helicopter
Contact_FirstName	Mr.
Contact_LastName	Waller
Contact_PhoneNu	6356
MachineChangeFr	8
EstCostPerService	$179.00
Company_Characte	NON RCRA HAZ
Hazardous	No
AF Owned	No

191 LBS Disposed 1999

MalmNumber	16
AccountNumber	1183032502
MachineNumber	34101778
ModelNumber	34
Machine Name	Safety Kleen
SolventType	Petroleum Naptha
SolventDensity	6.7
Length	0
Width	0
depth	
HoursUsedDaily	0
DaysUsedWeekly	0
WeeksUsedYearly	0
Location	1448
Squadron	341 TRANS
Office Symbol	LGTM
FunctionName	Truck Tractor
Contact_FirstName	Mr
Contact_LastName	Bullard
Contact_PhoneNu	2210
MachineChangeFr	8
EstCostPerService	$179.00
Company_Characte	NON RCRA HAZ
Hazardous	No
AF Owned	No

MalmNumber	17
AccountNumber	1183032493
MachineNumber	330558790
ModelNumber	23
Machine Name	Safety Kleen
SolventType	Petroleum Naptha
SolventDensity	6.7
Length	36
Width	24
depth	12
HoursUsedDaily	0.5
DaysUsedWeekly	5
WeeksUsedYearly	52
Location	1450
Squadron	819 RH
Office Symbol	LGTM
FunctionName	Vehicle Maintenance
Contact_FirstName	MSgt
Contact_LastName	Deets
Contact_PhoneNu	3788
MachineChangeFr	16
EstCostPerService	$207.00
Company_Characte	NON RCRA HAZ(where 2nd M
Hazardous	No
AF Owned	No

67 LBS disposed 1999

MalmNumber	18
AccountNumber	1183036023
MachineNumber	7077026697
ModelNumber	1107
Machine Name	Safety Kleen
SolventType	Paint Gun Cleaner
SolventDensity	6.7
Length	0
Width	0
depth	
HoursUsedDaily	0
DaysUsedWeekly	0
WeeksUsedYearly	0
Location	3075
Squadron	341 MXS
Office Symbol	LGMDC
FunctionName	MXS Corrosion
Contact_FirstName	Mr.
Contact_LastName	Schmitt
Contact_PhoneNu	4279
MachineChangeFr	8
EstCostPerService	$140.00
Company_Characte	F005 F003 D001 D018 D035 D
Hazardous	Yes
AF Owned	No

108 LBS Disposed 1999

MalmNumber	19
AccountNumber	0
MachineNumber	0
ModelNumber	0
Machine Name	Smart Washer
SolventType	
SolventDensity	
Length	0
Width	0
depth	0
HoursUsedDaily	0
DaysUsedWeekly	0
WeeksUsedYearly	0
Location	82110
Squadron	341 CES
Office Symbol	CEOIP
FunctionName	Heat Plant
Contact_FirstName	
Contact_LastName	Spicer
Contact_PhoneNu	6431
MachineChangeFr	0
EstCostPerService	$0.00
Company_Characte	
Hazardous	No
AF Owned	Yes

MalmNumber	20
AccountNumber	1183032345
MachineNumber	33055879
ModelNumber	33
Machine Name	Safety Kleen
SolventType	Safety Kleen 15
SolventDensity	6.7
Length	36
Width	35
depth	26
HoursUsedDaily	4
DaysUsedWeekly	5
WeeksUsedYearly	52
Location	82110
Squadron	341 CES
Office Symbol	CEOIP
FunctionName	Heat Plant
Contact_FirstName	
Contact_LastName	Spicer
Contact_PhoneNu	6431
MachineChangeFr	16
EstCostPerService	$207.00
Company_Characte	D008, D018, D039, D040
Hazardous	Yes
AF Owned	No

107 LBS disposed 1999

Dat: ... 0/00

AF FORM 2761 - HAZARDOUS MATERIAL USE

Command: AFSPC Orgn: 341 LSS Office: LGLOM BES-WPID:
Bldg: 3080 Shop Location: BLDG 3080/U80 Shop Code: 230HP Orgn Title: MISSILE WING MATERIEL CONTROL
Supv Name: PAT MERRILL Phone No.: (731) -42-47 CSA Id: 02

NSN / Cage	Proc Code / Ver	Comp / Amt Min	Noun / Manufacturer's Name / Amt Max	Conc	% By	CAS	Specification / NIOSH	Part Number/Trade Name / Chemical Name	Disposal Method	INH	ABS	Unit Size / MSDS ING	UI Unit / MSDS Date / CON	Pkg
6850P052712	CL01		CORROSION INHB., VAPOR						CONSUMED IN USE			128.00	OZ	GL
1JX29	1	1	HOTSY CORP THE CHEMICAL DIV					VAPOR CORROSION INHIBITOR, 052712				Y	8/ 1/96	
		7.00	13.00	%	W	0000110918	QD6475000	MORPHOLINE		Y	Y	Y	Y	
Total Qty Issu 1.00														
6850P3008	FA01		FUEL, ADDITIVE, DIESE				3008		CONSUMED IN USE			8.00	OZ	
POWER	1	1	POWER SERVICE PRODUCTS, INC.					FUEL, ADDITIVE, DIESEL						
		80.00	80.00	%	W	0000000004		MSDS IS PROPRIETARY				Y	6/15/94	
Total Qty Issu 33.00														
6850P4408	FA01		COMPOUND				4408		CONSUMED IN USE			1.00	KT	KT
55203	1	1	3M; TELECOM MARKETS DIV					HAPLEC 4408 BLOCKING COMPOUND PART A				Y	3/ 4/97	
		60.00	70.00	%	V	0004098719	NQ9370000	ISOPHORONE DIISOCYANATE		Y	N	N	Y	
		30.00	40.00	%	V	0068951417		IPDI PREPOLYMER		N	N	N	N	
Total Qty Issu 30.00														
55203	1	2	3M; TELECOM MARKETS DIV					HAPLEC 4408 BLOCKING COMPOUND PART B				Y	3/ 4/97	
		15.00	20.00	%	V	0000102603		TETRAHYDROXYPROPYL ETHYLENEDIAMINE						
		30.00	35.00	%	V	0005333426		2-OCTYL DODECANOL						
		1.00	1.00	%	V	0007631869		SILICA		Y			Y	
		5.00	10.00	%	V	0025322694		POLYPROPYLENE GLYCOL						
		35.00	40.00	%	V	0069102905		HIGH MOLECULAR WT POLYOL						
Total Qty Issu 30.00														
6850P52655B	FA01		CLEANER, VEHICLE, HOTSY				52655B	aqueous	CONSUMED IN USE			55.00	GL	DR
1JX29	1	1	HOTSY CORP THE CHEMICAL DIV									Y	4/ 4/96	
		1.00	5.00	%	V	0000098000		FURFURYL ALCOHOL		Y	N	Y	Y	
		1.00	5.00	%	V	0000111762	KJ8575000	ETHYLENE GLYCOL MONO-N-BUTYL ETHER		Y	Y	Y	Y	
		1.00	5.00	%	V	0009036195		POLYETHYLENE GLYCOL MONO(OCTYLPHENYL) ETH						
		1.00	5.00	%	V	0025155300		SODIUM DODECYLBENZENESULFONATE						
Total Qty Issu 10.00														
6850P5770-808	CL01		CLEANER, DEGREASER, SHOPMASTER				5770-808		CONSUMED IN USE			55.00	GL	DR
0YG51	1	1	BUCKEYE INTERNATIONAL INC					SHOPMASTER, 5770				Y	1/ 1/97	
		10.00	10.00	%	W	0000770354		1-PHENOXY-2-PROPANOL						

Command: AFSPC Orgn: 341 CS Office: SCMJ BES-WPID: Shop Code: MM246 Orgn Title: COMMUNICATIOPN CONTROL CENTER
Bldg: 500 Shop Location: RM 340M DLVD (500) Supv Name: CAPT GEORGE B. KINNEY Phone No.: (678) 4 - CSA Id: 99

NSN / Cage	Proc Code / Ver	Comp	Amt Min	Noun / Manufacturer's Name / Amt Max	Conc	% By	CAS	Specification / NIOSH	Part Number/Trade Name / Chemical Name	Disposal Method	INH	ABS	Unit Size / MSDS ING	UI Unit / MSDS CON	Pkg / Date
6850009262275	PM08			CLEANER, WINDSHIELD, SO-SURE				O-C-1901		CONSUMED IN USE			16.00	OZ	BT
1A864	1	1		LHB INDUSTRIES INC					CEANER, WINDSHIELD				Y	3/ 1/94	
			72.68	72.68	%	W	0000067561	PC1400000	METHANOL		Y	N	Y	Y	
Total Qty Issu 17.00															
6850P52655B	PM08			CLEANER, VEHICLE, HOTSY				52655B		CONSUMED IN USE			55.00	GL	
1JX29	1	1		HOTSY CORP THE CHEMICAL DIV									Y	4/ 4/96	
			1.00	5.00	%	V	0000098000		FURFURYL ALCOHOL		Y	N	Y	Y	
			1.00	5.00	%	V	0000111762	KJ8575000	ETHYLENE GLYCOL MONO-N-BUTYL ETHER		Y	Y	Y	Y	
			1.00	5.00	%	V	0009036195		POLYETHYLENE GLYCOL MONO(OCTYLPHENYL) ETI						
			1.00	5.00	%	V	0025155300		SODIUM DODECYLBENZENESULFONATE						
Total Qty Issu 3.00															
9150014385875-1	PM08			LUBRICATING OIL, ENGINE				MIL-L-2104		CONSUMED IN USE			32.00	OZ	BT
30530	1	1		SAFETY-KLEEN CORP					10W30, OIL RE-REFINED				Y	8/11/97	
			0.00	6.00	%	W	0064742547		HYDROTREATED HEAVY PARAFFINIC DISTILLATE						
			0.00	50.00	%	W	0064742570		HYDROTREATED RESIDUAL OIL						
			30.00	96.00	%	W	0064742581		PARAFFINIC MINERAL OIL						
			0.00	50.00	%	W	0064742627		SOLVENT DEWAXED RESIDUAL OIL						
			0.00	6.00	%	W	0064742650		SOLVENT DEWAXED HEAVY PARAFFINIC DISTILLATI						
			0.00	1.60	%	W	0068411461		ANTIOXIDANT						
			0.00	50.00	%	W	0072623837		LUBRICATING OILS, HYDROTR						
Total Qty Issu 10.00															

ate Run: 6/20/00

AF FORM 2761 - HAZARDOUS MATERIAL USE

Command: AFSPC Orgn: 341 CES Office: CEOIP BES-WPID: 00124-CERH-018B Shop Code: 852HV Orgn Title: CENTRAL HEAT PLANT
Bldg: 82110 Shop Location: RM N/A DLVD 471 Supv Name: KEN KOGER Phone No.: (643) 4 - CSA Id: 99

NSN / Cage	Proc Code / Ver	Comp / Amt Min	Noun / Manufacturer's Name / Amt Max	Conc	% By	CAS	Specification / NIOSH	Part Number/Trade Name / Chemical Name	Disposal Method	INH	ABS	Unit Size / MSDS ING	UI Unit / MSDS CON	Pkg Date
850002709986	FA03		SEA MARKER U/I=12 EA				MIL-S-17980		CONSUMED IN USE			12.00	EA	PK
25521	C	1	PRESTO-DYECHEM CO INC					URANINE DYE				Y	1/ 1/94	
						0000518478		ACID YELLOW 73						
Total Qty Issu 3.00														
850003606588	FA05		CLEANER, LUBE,ELECT CONTACT				415 FREON TF		INDUSTRIAL WASTE TREATM			16.00	CN	
33451	2	1	AERVOE-PACIFIC CO INC					415 CONTACT CLEANER				Y	1/14/93	
		0.00	5.00	%	W	0000064175	KQ6300000	ETHANOL		Y	N	Y	Y	
		0.00	5.00	%	W	0000067561	PC1400000	METHANOL		Y	N	Y	Y	
		3.00	3.00	%	W	0000110543	MN9275000	HEXANE		Y	N	Y	Y	
		90.00	90.00	%	W	0000124389	FF6400000	CARBON DIOXIDE		Y	N	N	Y	
Total Qty Issu 12.00														
850006211819	TS01		LEAK TST COMPND 4OZ				MIL-PFR-25567		CONSUMED IN USE			4.00	OZ	BT
03530	1	1	AMERICAN GAS AND CHEMICAL CO LTD					LEAK-TEC OX-65C				Y	6/ 3/96	
		60.00	60.00	%	V	0000107211	KW2975000	ETHYLENE GLYCOL		Y	N	Y	Y	
Total Qty Issu 3.00														
350008237861-1	AD07		FUEL, ENGINE PRIMER				65-180		CONSUMED IN USE			11.00	OZ	CN
5N004	1	1	SPRAYON PRODUCTS DIV OF SHERWIN-WILLIAMS CO					FUEL, ENGINE STARTING				Y	11/ 1/96	
					U	0000060297	KI5775000	ETHYL ETHER		Y	N	Y	Y	
					U	0008002059		PETROLEUM						
Total Qty Issu 2.00														
350PSW2	FA01		DEGREASER,SMARTWASHER SW-2						CONSUMED IN USE			5.00	GL	BK
06BT8	1	1	CHEMFREE CORPORATION					SMARTWASHER SW-2				Y	8/22/97	
						0000000001		NON HAZARDOUS INGREDIENTS						
Total Qty Issu 24.00														
01000N077078-1	FA03		PAINT, AEROSOL, ENAMEL						INDUSTRIAL WASTE TREATM			16.00	OZ	CN
PPGXX	A	1	PPG INDUSTRIES INC					DAR (061495M)				Y	8/16/95	
		1.00	2.00	%	W	0000078933	EL6475000	METHYL ETHYL KETONE		Y	N	Y	Y	

			MARKER ... 12 EA			MIL-S-17980			CONSUMED IN USE		12.00	EA	PK
	C		1	PRESTO-DYECHEM CO INC				URANINE DYE					
						0000518478	LM5425000	FLUORESCEIN, DISODIUM SALT		Y		01/01/1994	
Total Qty Issued:	3.00												
6850006211819	TS01	LEAK TST COMPND 4OZ				MIL-PFR-25567			CONSUMED IN USE		4.00	OZ	BT
03530	1		1	AMERICAN GAS AND CHEMICAL CO		1.09	99.70	LEAK-TEC OX-65C					
		60.00	60.00	%	V	0000107211	KW2975000	ETHYLENE GLYCOL		Y		06/03/1996	
Total Qty Issued:	3.00												
6850008237861-1	AD07	FUEL, ENGINE PRIMER				65-180			CONSUMED IN USE		11.00	OZ	CN
5N004	1		1	SPRAYON PRODUCTS DIV OF SHERWIN-WILLIAMS CO				FUEL, ENGINE STARTING					
				U		0000060297	KI5775000	ETHYL ETHER		Y		11/01/1996	
				U		0008002059	SE7175000	PETROLEUM					
Total Qty Issued:	2.00												
6850P10714	CL03	WD-40 OIL LUBE GENERA				WD-40			CONSUMED IN USE		8.00	OZ	CN
09137	1		1	WD-40 CO				OIL, LUBE, GENERAL-PURPOSE					
		50.00	50.00	%	V	0008052413	WJ8925000	STODDARD SOLVENT		Y		12/16/1997	
		15.00	100.00	%	V	0064742650	PY8038500	PETROLEUM DISTILLATES, SOLVENT-DEWAXED HEAVY PARAFFINIC					
		25.00	25.00	%	V	0068476857	SE7545000	L.P.G					
Total Qty Issued:	3.00												
6850PSW2	FA01	DEGREASER,SMARTWASHER SW-2							CONSUMED IN USE		5.00	GL	BK
06BT8	1		1	CHEMFREE CORPORATION		1.08		SMARTWASHER SW-2					
						0000000001		NON HAZARDOUS INGREDIENTS		Y		08/22/1997	
Total Qty Issued:	12.00												
801000F007713	MT03	CORROSION RESISTANT PRIMER							CONSUMED IN USE		128.00	OZ	CN
05972	B		1	LOCTITE CORP		1.30		81139 DURO EXTEND RUST TREATMENT					
		1.00	3.00	%	W	0000057556	TY2000000	PROPYLENE GLYCOL		Y		01/22/1996	
		1.00	3.00	%	W	0000111762	KJ8575000	2-BUTOXYETHANOL					
		5.00	10.00	%	W	0007727437	CR0600000	BARIUM SULFATE					
		45.00	50.00	%	W	0007732185	ZC0110000	WATER					
		1.00	3.00	%	W	0112945525	VV7310000	SILICA, AMORPHOUS					
Total Qty Issued:	3.00												
8010P04-022	PA01	PRIMER, RED OXIDE				04-022-PP			CONSUMED IN USE		1.00	GL	CN
1DV68	1		1	COLUMBIA PAINT CO		1.28	62.54	RED OXIDE METAL PRIMER ZINC PHOSPHATE, 04-022-PP		Y		07/02/1997	
		6.65	6.65	%	W	0001309371	NO7400000	IRON(III) OXIDE					
		8.75	8.75	%	W	0001317653	EV9580000	LIMESTONE					
		4.38	4.38	%	W	0007779900	TD0590000	PHOSPHORIC ACID, ZINC SALT (2:3)					
		37.86	37.86	%	W	0008052413	WJ8925000	STODDARD SOLVENT					
		26.31	26.31	%	W	0014807966	WW2710000	TALC					

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24617	1	1	GENERAL MOTORS CORP			0.85		1051515, WINSHIELD CLEANER		Y	10/13/1989	
		0.30	0.30	%	W	0000064028	AH5075000	TETRASODIUM EDTA				
		81.00	81.00	%	W	0000067561	PC1400000	METHANOL				
		1.50	1.50	%	W	0000141435	KJ5775000	ETHANOLAMINE				
		17.00	17.00	%	W	0007732185	ZC0110000	WATER				
		0.10	0.10	%	W	0009016459	AX0247000	NONYL PHENYL POLYETHYLENE GLYCOL ETHER				
Total Qty Issued:	14.00											
6850P52655B	AD07	CLEANER, VEHICLE, HOTSY				52655B			CONSUMED IN USE	55.00	GL	DR
1JX29	1	1	HOTSY CORP THE CHEMICAL DIV							Y	04/04/1996	
		1.00	5.00	%	V	0000098000	LU9100000	FURFURYL ALCOHOL				
		1.00	5.00	%	V	0000111762	KJ8575000	2-BUTOXYETHANOL				
		1.00	5.00	%	V	0009036195	MD0907600	POLYETHYLENE GLYCOL OCTYLPHENYL ETHER				
		1.00	5.00	%	V	0025155300	DB6825000	SODIUM DODECYLBENZENESULFONATE				
Total Qty Issued:	1.00											
6850P7490	AD07	CLEANER, FUEL INJECTOR				7490			CONSUMED IN USE	12.00	OZ	CN
01326	1	1	PENNZOIL CO			0.80		GUMOUT TUNE UP SPRAY FOR FUEL INJECTORS		Y	04/11/1995	
		1.00	1.00	%	W	0000000002		NO INGREDIENTS LISTED ON MSDS				
		1.00	10.00	%	W	0000067641	AL3150000	ACETONE				
		10.00	20.00	%	W	0000074986	TX2275000	PROPANE				
		70.00	80.00	%	W	0001330207	ZE2100000	XYLENE (MIXED)				
Total Qty Issued:	30.00											
8010002812077	FA01	STAIN, OIL, MAPLE				TT-S-711			CONSUMED IN USE	32.00	OZ	CN
6F266	1	1	FARWEST PAINT MFG CO					STAIN, OIL, DARK WALNUT, INTERIOR		Y	06/01/1992	
		55.07	55.07	%	W	0008032324	OI6180000	PETROLEUM ETHER				
Total Qty Issued:	1.00											
803000D020036	AD07	ADHESIVE SEALANT				08633			CONSUMED IN USE	8.00	OZ	TU
52157	1	1	3M; AUTOMOTIVE TRADES DIV			0.87	45.00	P/N 08633 WINDO-WELD RESEALANT (FLOW GRADE)		Y	08/20/1992	
		5.00	10.00	%	W	0000108872	GV6125000	METHYLCYCLOHEXANE				
		5.00	10.00	%	W	0000108883	XS5250000	TOLUENE				
		0.00	2.00	%	W	0000110827	GU6300000	CYCLOHEXANE				
		5.00	10.00	%	W	0000142825	MI7700000	N-HEPTANE				
		1.00	5.00	%	W	0000471341	FF9335000	CALCIUM CARBONATE				
		5.00	10.00	%	W	0001333864	FF5800000	CARBON BLACK				
		1.00	5.00	%	W	0008032324	OI6180000	PETROLEUM ETHER				
		5.00	15.00	%	W	0008052424	CI9900000	ASPHALT				
		10.00	20.00	%	W	0009003296	EM9032000	BUTENE, POLYMERS				
		15.00	25.00	%	W	0009010859		1,3-BUTADIENE, 2-METHYL-, POLYMER WITH 2-METHYL-1-PROPENE				
		1.00	5.00	%	W	0063231674	VV7340000	SYNTHETIC AMORPHOUS SILICA				
		10.00	20.00	%	W	0064742898		SOLVENT NAPHTHA (PETROLEUM, LIGHT)				
Total Qty Issued:	5.00											
803000N035086	AD07	ADHESIVE SEALANT				8505			CONSUMED IN USE	14.00	OZ	TU
76381	1	1	3M; CORPORATE OFFICES				17.00	FAST N FIRM SEALER, 8505		Y	07/08/1987	

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AMJET		1	1	AMERICAN JETWAY			0.70		81870, 81870-1, DURA-LUBE WHITE GREASE TM3124		Y	07/14/1997	
			10.00	10.00	%	W	0000000002		NO INGREDIENTS LISTED ON MSDS				
			30.00	30.00	%	W	0000074986	TX2275000	PROPANE				
			40.00	40.00	%	W	0000110543	MN9275000	HEXANE				
			10.00	10.00	%	W	0007620771		OCTADECANOIC ACID, 12-HYDROXY-, MONOLITHIUM SALT				
			40.00	40.00	%	W	0064742650	PY8038500	PETROLEUM DISTILLATES, SOLVENT-DEWAXED HEAVY PARAFFINIC				
Total Qty Issued:		18.00											
6850014413223		RR07	ANTIFREEZE, 55GL				MIL-A-46153			CONSUMED IN USE	55.00	GL	DR
0U3B1		1	1	OLD WORLD INDUSTRIES INC			1.12		FLEET CHARGE HEAVY DUTY COLLANT/ANTIFREEZE		Y	02/01/1996	
			90.00	95.00	%	W	0000107211	KW297500	ETHYLENE GLYCOL				
			0.00	5.00	%	W	0000111466	ID5950000	DIETHYLENE GLYCOL				
Total Qty Issued:		1.00											
6850P4620		RR07	BRAKE CLEANER				4620			CONSUMED IN USE	15.00	OZ	CN
0WT79		1	1	PENRAY COMPANIES			0.87		SERVICE PRO NON-CLORINATED BRAKE CLEANER 4620		Y	06/24/1996	
			15.00	20.00	%	W	0000067641	AL3150000	ACETONE				
			1.00	5.00	%	W	0000124389	FF6400000	CARBON DIOXIDE				
			50.00	55.00	%	W	0000142825	MI7700000	N-HEPTANE				
			20.00	25.00	%	W	0001330207	ZE2100000	XYLENE (MIXED)				
Total Qty Issued:		12.00											
6850P52655B		CL01	CLEANER, VEHICLE, HOTSY				52655B			CONSUMED IN USE	55.00	GL	DR
1JX29		1	1	HOTSY CORP THE CHEMICAL DIV							Y	04/04/1996	
			1.00	5.00	%	V	0000098000	LU9100000	FURFURYL ALCOHOL				
			1.00	5.00	%	V	0000111762	KJ8575000	2-BUTOXYETHANOL				
			1.00	5.00	%	V	0009036195	MD090760	POLYETHYLENE GLYCOL OCTYLPHENYL ETHER				
			1.00	5.00	%	V	0025155300	DB6825000	SODIUM DODECYLBENZENESULFONATE				
Total Qty Issued:		2.00											
6850PWHC032-55		RR07	CLEANER, DEGREASER, WORK HORSE				WHC032			CONSUMED IN USE	55.00	GL	DR
DANDY		1	1	DANDY PRODUCTS, INC			1.12		WAR HORSE GREASR & SCUZ REMOVER		Y	04/11/1994	
			0.00	93.00	%	W	0000000001		NON HAZARDOUS INGREDIENTS				
			0.00	6.00	%	W	0000111762	KJ8575000	2-BUTOXYETHANOL				
			0.00	6.00	%	W	0006834920	VV927500	SODIUM METASILICATE				
Total Qty Issued:		1.00											
7930P59030		RR07	CLEANER, FLUSH SOLVENT				59030			CONSUMED IN USE	128.00	OT	GL
VALVO		1	1	VALVOLINE					FLUSH SOLVENT		Y	11/07/1995	
			100.00	100.00	%	W	0001717006	KI0997000	1,1-DICHLORO-1-FLUOROETHANE (HCFC-141B)				
Total Qty Issued:		3.00											
8010P20033		RR07	PAINT, ENAMEL, FLAT BLACK							CONSUMED IN USE	12.00	OZ	CN
0WT79		1	1	PENRAY COMPANIES			0.79		PAINT,20033		Y	03/05/1996	
			25.00	30.00	M		0000067641	AL3150000	ACETONE				
			10.00	20.00	M		0000108883	XS5250000	TOLUENE				
			1.00	5.00	M		0001330207	ZE2100000	XYLENE (MIXED)				

5G √ 0%

9150P19001	FA01	FLUID, TRANSMISSION, AUTOMATIC				19001			CONSUMED IN USE		15.00	OZ	CN
0XH81	1	1	INTERNATIONAL LUBRICANTS INC			0.85		DR TRANNY KOOLER KLEEN		Y		01/20/1998	
		5.00	20.00	%	W	0000067630	NT8050000	ISOPROPYL ALCOHOL					
		30.00	30.00	%	W	0000124389	FF6400000	CARBON DIOXIDE					
		60.00	60.00	%	W	0008052413	WJ8925000	STODDARD SOLVENT					
Total Qty Issued:	6.00												
6850P10714	AD07	WD-40 OIL LUBE GENERA				WD-40			CONSUMED IN USE		8.00	OZ	CN
09137	1	1	WD-40 CO					OIL, LUBE, GENERAL-PURPOSE		Y		12/16/1997	
		50.00	50.00	%	V	0008052413	WJ8925000	STODDARD SOLVENT					
		15.00	100.00	%	V	0064742650	PY8038500	PETROLEUM DISTILLATES, SOLVENT-DEWAXED HEAVY PARAFFINIC					
		25.00	25.00	%	V	0068476857	SE7545000	L.P.G					
Total Qty Issued:	5.00												
6850P52655B	AD07	CLEANER, VEHICLE, HOTSY				52655B			CONSUMED IN USE		55.00	GL	DR
1JX29	1	1	HOTSY CORP THE CHEMICAL DIV							Y		04/04/1996	
		1.00	5.00	%	V	0000098000	LU9100000	FURFURYL ALCOHOL					
		1.00	5.00	%	V	0000111762	KJ8575000	2-BUTOXYETHANOL					
		1.00	5.00	%	V	0009036195	MD0907600	POLYETHYLENE GLYCOL OCTYLPHENYL ETHER					
		1.00	5.00	%	V	0025155300	DB6825000	SODIUM DODECYLBENZENESULFONATE					
Total Qty Issued:	2.00												
8010P5068	AD07	PAINT, AEROSOL				5068			CONSUMED IN USE		12.00	OZ	CN
0A6H9	1	1	CERTIFIED LABORATORIES, DIV OF NCH CORP					FREE, W/MOLY AEROSOL		Y		01/21/1997	
		1.00	1.00	%	W	0000075285	TZ4300000	ISOBUTANE					
		1.00	1.00	%	W	0000141786	AH5425000	ETHYL ACETATE					
		1.00	1.00	%	W	0008052413	WJ8925000	STODDARD SOLVENT					
Total Qty Issued:	1.00												
8030P6M	AD07	SEALANT				6M			CONSUMED IN USE		12.00	OZ	TU
08028	1	1	LOCTITE CORP; AUTOMOTIVE AND CONSUMER GROUP					FORM-A-GASKET SILICONE BLUE RTV GASKET MAKER, 6M		Y		10/27/1993	
		1.00	5.00	%	W	0004253343	VV4500000	SILANE, METHYLTRIACETOXY-					
		80.00	85.00	%	W	0063148629	JT6484500	DOW CORNING 360 FLUID					
		10.00	15.00	%	W	0112945525	VV7310000	SILICA, AMORPHOUS					
Total Qty Issued:	1.00												
8040P24200	AD07	ADHESIVE				24200			CONSUMED IN USE		0.20	OZ	TU
0PKX7	1	1	LOCTITE CORP					THREAD LOCKER BLUE		Y		05/19/1995	
		1.00	3.00	%	W	0000067561	PC1400000	METHANOL					
		1.00	3.00	%	W	0000080159	MX2450000	HYDROPEROXIDE, 1-METHYL-1-PHENYLETHYL-					
		3.00	5.00	%	W	0000081072	DE4200000	SACCHARIN					
		1.00	1.00	%	W	0000613489		BENZENAMINE, N,N-DIETHYL-4-METHYL-					
		25.00	30.00	%	W	0009004960	MD0880000	GLYCOLS, POLYETHYLENE, MONOOLEATE					
		0.10	0.50	%	W	0013463677	XR2275000	TITANIUM DIOXIDE					
		60.00	65.00	%	W	0025852475		POLY(OXY-1,2-ETHANEDIYL), .ALPHA.-(2-METHYL-1-OXO-2-PROPENYL)-.OMEGA.-[(2-METHYL-1-OXO-2-PROPENYL)OX					
		1.00	3.00	%	W	0112945525	VV7310000	SILICA, AMORPHOUS					

		1.00	10.00	%	V	0000111762	KJ8575000	2-BUTOXYETHANOL					
		70.00	80.00	%	V	0007732185	ZC0110000	WATER					
Total Qty Issued:	1.00												
793000F039292	CL01	CLEANER, DEGREASER							BULK CONTAINER		45.00	LB	CO
1JX29	B	1	HOTSY CORP THE CHEMICAL DIV			1.00		TUBMATE ALL PURPOSE		Y		06/01/1993	
		1.00	5.00	%	W	0000111762	KJ8575000	2-BUTOXYETHANOL					
		30.00	60.00	%	W	0006834920	VV9275000	SODIUM METASILICATE					
						0007758294	YK4570000	SODIUM PHOSPHATE, TRIBASIC					
Total Qty Issued:	1.00												
7930013003536	FA01	DETERGENT, HOSPITAL GLASSWARE							CONSUMED IN USE		1,000.00	ML	BT
41373	1	1	UNIDENT S.A. FOR MDT CORP			1.45		MICRO 12		Y		01/14/1991	
		9.00	9.00	%	V	0007647010	MW402500	HYDROGEN CHLORIDE					
		1.00	1.00	%	W	0007664382	TB6300000	PHOSPHORIC ACID					
		1.00	1.00	%	W	0007664939	WS5600000	SULFURIC ACID					
				U		0007732185	ZC0110000	WATER					
Total Qty Issued:	2.00												
7930013282030	FA01	DEGREASER							CONSUMED IN USE		5.00	GL	CN
0JVH6	1	1	P-T TECHNOLOGIES			0.76	100.00	PF DEGREASER SOLVENT		Y		12/13/1995	
				U		0000000002		NO INGREDIENTS LISTED ON MSDS					
Total Qty Issued:	4.00												
7930013393425-1	FA01	CLEANING COMPOUND, SOLVENT-DETERGENT							CONSUMED IN USE		18.00	OZ	CN
56883	1	1	PENETONE CORP SUB OF WEST CHE			0.98		CITRIKLEEN		Y		07/05/1991	
		5.00	5.00	%	W	0001310732	WB4900000	SODIUM HYDROXIDE					
		10.00	10.00	%	W	0001344098		SODIUM SILICATE					
		15.00	15.00	%	W	0007632000	RA1225000	SODIUM NITRITE					
Total Qty Issued:	4.00												
8010000793760	PA07	PAINT, ENAMEL, AEROSOL, RED 11136							CONSUMED IN USE		16.00	OZ	CN
54626	1	1	SHERWIN-WILLIAMS CO			1.00	8,190.00	2101 CHERRY RED, KRYLON INT/EXT ENAMEL		Y		04/10/1989	
		30.00	50.00	%	W	0000067641	AL3150000	ACETONE					
		1.00	5.00	%	W	0000071363	EO1400000	N-BUTYL ALCOHOL					
		10.00	30.00	%	W	0000074986	TX2275000	PROPANE					
		5.00	10.00	%	W	0000078933	EL6475000	METHYL ETHYL KETONE					
		1.00	5.00	%	W	0000108101	SA9275000	METHYL ISOBUTYL KETONE					
		5.00	10.00	%	W	0000108656	AI8925000	PROPYLENEGLYCOL MONOMETHYL ETHER ACETATE					
		1.00	5.00	%	W	0000108883	XS5250000	TOLUENE					
		10.00	30.00	%	W	0001330207	ZE2100000	XYLENE (MIXED)					
Total Qty Issued:	1.00												
8010001412952	PA07	PAINT, ENAMEL, AEROSOL, RED 11136				11136			CONSUMED IN USE		16.00	OZ	CN
0FTT5	1	1	LHB INDUSTRIES			0.95		SPRAY PAINT, AEROSOL, SO-SURE RED #11136 (0014-111)		Y		10/10/1995	
		9.46	9.46	%	W	0000067641	AL3150000	ACETONE					
		1.71	1.71	%	W	0000071363	EO1400000	N-BUTYL ALCOHOL					

SAFETY-KLEEN HEAVY DUTY LACQUER THINNER 6782

MATERIAL SAFETY DATA SHEET FOR USA AND CANADA

safety-kleen.

SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: **SAFETY-KLEEN HEAVY DUTY LACQUER THINNER 6782**

SYNONYM(S): Not applicable.

PRODUCT PART NUMBER: 6782

PRODUCT USE: Paint gun cleaner.
If this product is used in combination with other products, refer to the Material Safety Data Sheets for those products.

	24-HOUR EMERGENCY PHONE NUMBERS	
These numbers are for emergency use only. If you desire non-emergency product information, please call a phone number listed below.	MEDICAL: 1-800-752-7869 Extension 2 or 1-312-906-6194	TRANSPORTATION (SPILL): 1-800-468-1760 (USA) 1-613-996-6666 (CANADA) (call collect)

SUPPLIER: Safety-Kleen Corp.
1301 Gervais Street, Suite 300
Columbia, SC 29201
USA
1-803-933-4200

TECHNICAL INFORMATION: **1-800-669-5740, Extension 7500**

MSDS FORM NUMBER: 82343

ISSUE: March 6, 2000

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SUPERSEDES: April 11, 1997

PREPARED BY: Product MSDS Coordinator

APPROVED BY: MSDS Task Force

SAFETY-KLEEN HEAVY DUTY LACQUER THINNER 6782
MATERIAL SAFETY DATA SHEET FOR USA AND CANADA

SECTION 2: COMPOSITION/INFORMATION ON INGREDIENTS

WT%	NAME	SYNONYM	CAS NO.	OSHA PEL TWA (ppm)	OSHA PEL STEL (ppm)	ACGIH TLV® TWA (ppm)	ACGIH TLV® STEL (ppm)	LD[a]	LC[b]
30-60	Toluene	Methylbenzene	108-88-3	200	300 (ceiling)	50 (skin)	N. Av.	636 (14100 ul/ kg[c])	49000 mg/ m^3/ 4 hours
0-60*	Methyl ethyl ketone	Butanone, 2-	78-93-3	200	N.Av.	200	300	2737 (6480 mg/ kg[c])	23500 mg/ m3/ 8 hours
0-60*	Methyl propyl ketone	2-Pentanone	107-87-9	200	N. Av.	200	250	1600 (6500 mg/ kg[c])	N. Av.
0-60*	Methyl isobutyl ketone	Hexone	108-10-1	100	N.Av.	50	75	2080 (>20 ml/ kg[c])	N. Av.
0-60*	2-Heptanone	Methyl n-amyl ketone	110-43-0	100	N.Av.	50	N.Av.	1670[g]	N.Av.
0-60*	C_5 to C_8 Aliphatic hydrocarbons	Low boiling hydrocarbons	64741-89-5	1000[h]	N. Av.	600[h]	N. Av.	N. Av.	364000 mg/ m^3/ 4 hours[h]
0-60*	C_9 to C_{13} Aliphatic hydrocarbons	Medium boiling hydrocarbons	8030-30-6	500[i]	N.Av.	100[i]	N.Av.	>5000[i]	>5500 mg/ m^3/ 4 hours[i]
0-30*	Ethylbenzene	Phenylethane	100-41-4	100	N.Av.	100	125	3500 (17800 ul/ kg[c])	N.Av.
0-20*	Acetone	Dimethyl ketone	67-64-1	1000	N.Av.	500	750	5800	50100 mg/ m^3/ 8 hours
0-17*	Iso-Propyl acetate	Acetoxypropane, 2-	108-21-4	250	N.Av.	100	200	6750 (>20 ml/ kg[c])	50000 mg/ m^3/ 8 hours
0-17*	Ethyl acetate	Acetic acid ethyl ester	141-78-6	400	N.Av.	400	N.Av.	5620 (>20 ml/ kg[c])	45000 mg/ m^3/ 2 hours
0-17*	Iso-Butyl acetate	Methyl propyl acetate, 2-	110-19-0	150	N.Av.	150	N.Av.	13400 (>17400 mg/ kg[c])	N. Av.
0-17*	N-Butyl acetate	Butyl ethanoate	123-86-4	150	N.Av.	150	200	10768 (>17600 mg/ kg[c])	2000 ppm/ 4 hours
0-17*	Propylene glycol methyl ether acetate	Methoxy-2-propanol acetate, 1-	108-65-6	100[d]	N.Av.	N.Av.	N.Av.	8532 (>5000 mg/ kg[c])	4345 ppm/ 6 hours
0-17*	Ethyl 3-ethoxypropionate	Ethyl beta-ethoxy propionate	763-69-9	50[f]	100[f]	N.Av.	N.Av.	4300	>1000 ppm/ 6 hours

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				OSHA PEL		ACGIH TLV®			
WT%	NAME	SYNONYM	CAS NO.	TWA (ppm)	STEL (ppm)	TWA (ppm)	STEL (ppm)	LD[a]	LC[b]
0-15*	Xylene	Dimethylbenzene	1330-20-7	100	N.Av.	100	150	4300 (>1700 mg/ kg[c])	5000 ppm/ 4 hours
0-10*	Ethyl alcohol	Ethanol	64-17-5	1000	N.Av.	1000	N.Av.	7060 (20000 mg/ kg[c])	20000 ppm/ 10 hours
0-10*	Iso-Propyl alcohol	Isopropanol	67-63-0	400	N.Av.	400[c]	500[e]	5045 (12800 mg/ kg[c])	16000 ppm/ 8 hours
0-10*	N-Butyl alcohol	Butanol	71-36-3	100	N. Av.	50[k] (skin) (ceiling)	N. Av.	790 (3400 mg/ kg[c])	8000 ppm/ 4 hours
0-10*	Tert-Butanol	Trimethylmethanol	75-65-0	100	N. Av.	100	N. Av.	3500	N. Av.
0-4*	Methyl alcohol	Methanol	67-56-1	200 (skin)	N.Av.	200 (skin)	250	5628 (15800 mg/ kg[c])	64000 ppm/ 4 hours
0-1*	1,1,1-Trichoroethane	Methyl chloroform	71-55-6	350	N.Av.	350	450	9600	18000 ppm/ 4 hours
0-1*	Methylene chloride	Dichloromethane	75-09-2	25	125 (15 minutes)	50	N.Av.	1600	N.Av.
0-1*	Perchloroethylene	Tetrachloroethylene	127-18-4	100	200 (ceiling)	25	100	2629 (>10000 mg/ kg[c])	34200 mg/ m3/ 8 hours

N.Av. = Not Available
* Even though the concentration range does not fall under the ranges prescribed by WHMIS, this is the actual range which varies with each batch of the product.

[a]Oral-Rat LD_{50} (mg/kg)
[b]Inhalation-Rat LC_{50}
[c]Skin-Rabbit LD_{50}
[d]AIHA recommended
[e]Notice of Intended Changes: 200 ppm TWA and 400 ppm STEL

[f]Manufacturer recommended.
[g]Skin-Rabbit LD_{50} 12.6 ml/kg
[h]Based on Pentane
[i]Based on Stoddard Solvent
[k]Notice of Intended Changes: 25 ppm (ceiling)

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SECTION 3: HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

APPEARANCE
Liquid, clear and colorless, solvent odor.

WARNING!

PHYSICAL HAZARDS
Extremely flammable liquid and vapor.
Vapor may cause flash fire.

HEALTH HAZARDS
May be harmful if inhaled.
May irritate eyes.
May be harmful if absorbed through the skin.
May be harmful if swallowed.
Suspect cancer hazard. Contains material (maximum 1 WT%) which may cause cancer. Risk of cancer depends on duration and level of exposure.
Contains material which may cause birth defects.
Contains material which may cause heart, liver, kidney, brain, eye, and central nervous system damage.

POTENTIAL HEALTH EFFECTS

INHALATION (BREATHING): High vapor or mist concentrations may be harmful if inhaled. High concentrations of vapor or mist may irritate the respiratory tract (nose, throat, and lungs). High concentrations of vapor or mist may cause nausea, vomiting, headaches, dizziness, loss of coordination, numbness, irregular heartbeat, drowsiness, and other central nervous system effects. High concentrations of vapor or mist may cause liver or kidney damage. Massive acute overexposure may cause rapid central nervous system depression, sudden collapse, coma, and/or death.

EYES: May cause severe irritation tearing, redness, swelling, burns, and eye damage.

SKIN: May cause irritation leading to dermatitis or blistering. Toluene, methyl alcohol, and n-butyl alcohol may be absorbed through the skin and cause harm as noted under **INHALATION (BREATHING)**.

INGESTION (SWALLOWING): May be harmful if swallowed. May cause throat irritation, nausea, vomiting, diarrhea, and central nervous system effects as noted under **INHALATION (BREATHING)**. Breathing product into the lungs during ingestion or vomiting may cause lung injury and possible death.

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MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Individuals with pre-existing cardiovascular, liver, kidney, respiratory tract (nose, throat, and lungs), central nervous system, eye, and/or skin disorders may have increased susceptibility to the effects of exposure.

CHRONIC: Prolonged or repeated inhalation may cause heart, liver, central nervous system, and kidney damage; and/or toxic effects as noted under **INHALATION (BREATHING)**. Prolonged or repeated eye contact may cause inflammation of the membrane lining the eyelids and covering the eyeball (conjunctivitis); burns, and/or eye damage. Prolonged or repeated skin contact may cause drying, cracking, redness, itching, and/or swelling (dermatitis); and/or blistering.

CANCER INFORMATION: This product contains methylene chloride and perchloroethylene which may cause cancer. Risk of cancer depends on duration and level of exposure. For more information, see **SECTION 11: CARCINOGENICITY**.

Also see **SECTION 15: CALIFORNIA.**

POTENTIAL ENVIRONMENTAL EFFECTS
Not available. Also see **SECTION 12: ECOLOGICAL INFORMATION.**

SECTION 4: FIRST AID MEASURES

INHALATION: (BREATHING) Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Oxygen should only be administered by qualified personnel. Someone should stay with victim. Get medical attention if breathing difficulty persists.

EYES: If irritation or redness from exposure to vapor develops, move away from exposure into fresh air. Upon contact, immediately flush eyes with plenty of lukewarm water, holding eyelids apart, for 15 minutes. Get medical attention.

SKIN: Remove affected clothing and shoes. Wash skin thoroughly with soap and water. Get medical attention if irritation or pain develops or persists.

INGESTION: (SWALLOWING) Do NOT induce vomiting. Immediately get medical attention. Call 1-800-752-7869, extension 2 or 1-312-906-6194 for additional information. If spontaneous vomiting occurs, keep head below hips to avoid breathing the product into the lungs. Never give anything to an unconscious person by mouth.

NOTE TO PHYSICIANS: Treat symptomatically and supportively. Increased sensitivity of the heart to Adrenaline (epinephrine) may be caused by overexposure to product. Administration of gastric lavage, if warranted, should be performed by qualified medical personnel. Treatment may vary with condition of victim and specifics of incident. Call 1-800-752-7869, extension 2 or 1-312-906-6194 for additional information.

SECTION 5: FIRE FIGHTING MEASURES

FLASH POINT: less than 70°F (21°C) Tag Closed Cup

FLAMMABLE LIMITS IN AIR: **LOWER:** 1 VOL% (approximately)
UPPER: 13 VOL% (approximately)

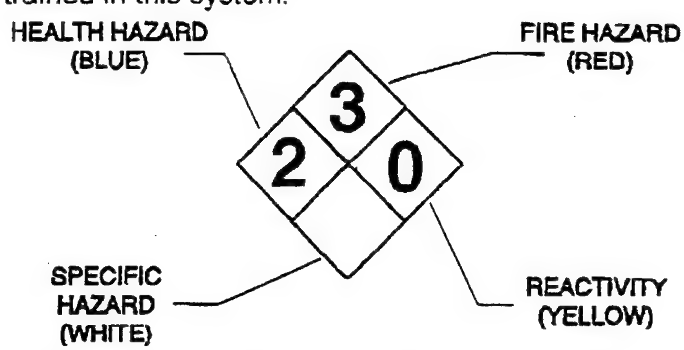
AUTOIGNITION TEMPERATURE: 800°F (427°C) (approximately)

HAZARDOUS COMBUSTION PRODUCTS: Decomposition and combustion materials may be toxic. Burning may produce phosgene, chlorides, chloroacetylenes, formaldehyde, peracetic acid, carbon monoxide, and unidentified organic compounds.

CONDITIONS OF FLAMMABILITY: Heat, sparks, or flame.

EXTINGUISHING MEDIA: Carbon dioxide, alcohol-resistant foam, dry chemical, or water spray.

NFPA 704 HAZARD IDENTIFICATION: This information is intended solely for the use by individuals trained in this system.



FIRE FIGHTING INSTRUCTIONS: Keep storage containers cool with water spray.
A positive-pressure, self-contained breathing apparatus (SCBA) and full-body protective equipment are required for fire emergencies.

FIRE AND EXPLOSION HAZARDS: Vapor explosion hazard indoors, outdoors, or in sewers. Vapors may travel to ignition source and flashback. Vapors will spread along the ground and collect in low or confined areas. Run-off to sewer may create a fire or explosion hazard. Heated containers may rupture, explode, or be thrown into the air. "Empty" containers may retain residue and can be dangerous. Not sensitive to mechanical impact. Product may be sensitive to static discharge, which could result in fire or explosion.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Remove all ignition sources. Do not touch or walk through spilled product. Stop leak if you can do it without risk. Wear protective equipment and provide engineering controls as specified in **SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION.** Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Ventilate area and avoid breathing vapor or mist. A vapor suppressing foam may be used to reduce vapors. Contain spill away from surface waters and sewers. Contain spill as a liquid for possible recovery or sorb with compatible sorbent material and shovel with a clean, sparkproof tool into a sealable container for disposal.

Additionally, for large spills: Water spray may reduce vapor, but may not prevent ignition in closed spaces. Dike far ahead of liquid spill for collection and later disposal.

There may be specific federal regulatory reporting requirements associated with spills, leaks, or releases of this product. Also see **SECTION 15: REGULATORY INFORMATION.**

SECTION 7: HANDLING AND STORAGE

HANDLING: Keep away from heat, sparks, or flame. Where flammable mixtures may be present, equipment safe for such locations should be used. Use clean, sparkproof tools and explosion-proof equipment. When transferring product, metal containers, including trucks and tank cars, should be grounded and bonded. Do not breathe vapor or mist. Use in a well ventilated area. Avoid contact with eyes, skin, clothing, and shoes. Do not smoke while using this product.

SHIPPING AND STORING: Keep container tightly closed when not in use and during transport. Store containers in a cool place. Do not pressurize, cut, weld, braze, solder, drill, or grind containers. Keep containers away from heat, flame, sparks, static electricity, or other sources of ignition; containers may explode and cause injury or death. Empty product containers may retain product residue and can be dangerous. See **SECTION 14: TRANSPORT INFORMATION** for Packing Group information.

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SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS: Provide general ventilation needed to maintain concentration of vapor or mist below applicable exposure limits. Where adequate general ventilation is unavailable, use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Where explosive mixtures may be present, equipment safe for such locations should be used.

PERSONAL PROTECTIVE EQUIPMENT

RESPIRATORY PROTECTION: Use NIOSH-certified, air-supplied respirators (self-contained breathing apparatus) or air-line when concentrations of methanol or methylene chloride may exceed applicable exposure limits. Use NIOSH-certified, full-face respirators with organic vapor cartridges respiratory protective equipment when concentration of vapor or mist of any of the other components exceeds applicable exposure limits. Selection and use of respiratory protective equipment should be in accordance in the USA with OSHA General Industry Standard 29 CFR 1910.134; or in Canada with CSA Standard Z94.4.

EYE PROTECTION: Where eye contact is likely, wear chemical goggles; contact lens use is not recommended.

SKIN PROTECTION: Where skin contact is likely, wear Viton®, polyvinyl alcohol (PVA), laminate, or equivalent protective gloves; use of natural rubber (latex), polyvinyl chloride (PVC), neoprene, or equivalent gloves is not recommended.

To avoid prolonged or repeated contact where spills and splashes are likely, wear appropriate chemical-resistant faceshield, boots, apron, whole body suits, or other protective clothing.

PERSONAL HYGIENE: Use good personal hygiene. Wash thoroughly with soap and water after handling product and before eating, drinking, or using tobacco products. Clean affected clothing, shoes, and protective equipment before reuse. Discard affected clothing, shoes, or protective equipment if they cannot be thoroughly cleaned. Discard leather articles, such as shoes, saturated with the product.

OTHER PROTECTIVE EQUIPMENT: Where spills and splashes are likely, facilities storing or using this product should be equipped with an emergency eyewash and shower, both equipped with clean water, in the immediate work area.

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SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE, APPEARANCE, AND ODOR:	Liquid, clear and colorless, solvent odor.
ODOR THRESHOLD:	Not available.
MOLECULAR WEIGHT:	Not available.
SPECIFIC GRAVITY:	0.83 (water = 1) (approximately)
DENSITY:	6.9 lb/US gal (830 g/l) (approximately)
VAPOR DENSITY:	2.2 to 3.9 (air = 1) (approximately)
VAPOR PRESSURE:	86 mm Hg at 68°F (20°C) 205 mm Hg at 100°F (38°C)
BOILING POINT:	133° to 342°F (56° to 172°C)
FREEZING/MELTING POINT:	-200° to -8° F (-129° to -22° C)
pH:	Not applicable.
EVAPORATION RATE:	3.7 (butyl acetate = 1) (based on a similar product)
SOLUBILITY IN WATER:	Slight.
FLASH POINT:	less than 70°F (21°C) Tag Closed Cup
FLAMMABLE LIMITS IN AIR:	**LOWER:** 1 VOL% (approximately) **UPPER:** 13 VOL% (approximately)
AUTOIGNITION TEMPERATURE:	800°F (427°C)

SECTION 10: STABILITY AND REACTIVITY

STABILITY: Stable under normal temperatures and pressures. Avoid heat, sparks, or flame.

INCOMPATIBILITY: Avoid acids, alkalies, oxidizing agents, reducing agents, reactive halogens, or reactive metals.

REACTIVITY: Polymerization is not known to occur under normal temperatures and pressures. Not reactive with water.

HAZARDOUS DECOMPOSITION PRODUCTS: None under normal temperatures and pressures. See also **SECTION 5: HAZARDOUS COMBUSTION PRODUCTS.**

SECTION 11: TOXICOLOGICAL INFORMATION

SENSITIZATION: Based on best current information, there is no known human sensitization associated with this product.

MUTAGENICITY: Perchloroethylene has demonstrated human effects of mutagenicity. Toluene, xylene, ethylbenzene, ethyl alcohol, isopropyl alcohol, methyl alcohol, ethyl acetate, 1,1,1-trichloroethane, and methylene chloride have demonstrated experimental effects of mutagenicity.

Based on best current information, the other components listed in **SECTION 2** are not mutagens.

CARCINOGENICITY: Methylene chloride is regulated by OSHA as a carcinogen. Perchloroethylene is categorized by IARC as probably carcinogenic to humans (Group 2A). Methylene chloride is categorized by IARC as possibly carcinogenic to humans (Group 2B). Perchloroethylene and methylene chloride are listed by NTP as having limited evidence of carcinogenicity in humans or sufficient evidence of carcinogenicity in experimental animals.

Ethylbenzene (under the Notice of Intended Changes), methylene chloride, and perchloroethylene are categorized by ACGIH as confirmed animal carcinogens with unknown relevance to humans (A3). These agents are carcinogenic in experimental animals at a relatively high dose, by route(s) of administration, at site(s), of histologic type(s), or by mechanism(s) that may not be relevant to worker exposure. Available epidemiologic studies do not confirm an increased risk of cancer in exposed humans. Available evidence does not suggest that the agents are likely to cause cancer in humans except under uncommon or unlikely routes or levels of exposure.

There is at least one valid, positive study indicating the carcinogenic potential of tert-butanol in animals.

Based on best current information, the other components listed in **SECTION 2** are not carcinogens.

Also see **SECTION 3: CANCER INFORMATION** and **SECTION 15: CALIFORNIA.**

REPRODUCTIVE TOXICITY: Ethylbenzene has demonstrated animal effects of reproductive toxicity. Xylene, toluene, methyl ethyl ketone, isopropyl alcohol, methyl alcohol, ethyl alcohol, perchloroethylene, 1,1,1-trichloroethane, and methylene chloride have demonstrated experimental effects of reproductive toxicity.

Based on best current information, the other components listed in **SECTION 2** are not reproductive toxicants.

Also see **SECTION 15: CALIFORNIA.**

TERATOGENICITY: Ethylbenzene has demonstrated animal effects of teratogenicity. Toluene, ethyl alcohol, methyl ethyl ketone, N-butyl acetate, isopropyl alcohol, methyl alcohol, n-butyl alcohol, perchloroethylene, and 1,1,1-trichloroethane have demonstrated experimental effects of teratogenicity.

Based on best current information, the other components listed in **SECTION 2** are not teratogens.

TOXICOLOGICALLY SYNERGISTIC PRODUCT(S): Based on best current information, there are no known toxicologically synergistic products associated with this product.

SECTION 12: ECOLOGICAL INFORMATION

ECOTOXICITY: Not available.

OCTANOL/WATER PARTITION COEFFICIENT: Not available.

VOLATILE ORGANIC COMPOUNDS: 80 to 100 WT%; 5.5 to 6.9 lb/US gal; 664 to 830 g/l (approx.) As per 40 CFR Part 51.100(s).

SECTION 13: DISPOSAL CONSIDERATIONS

DISPOSAL: Dispose in accordance with federal, state, provincial, and local regulations. Regulations may also apply to empty containers. The responsibility for proper waste disposal lies with the owner of the waste. Contact Safety-Kleen regarding recycling or proper disposal.

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USEPA WASTE CODE(S): D001, D018, D035, D039
Based on available data, this information applies to the product as supplied to the user. Processing, use, or contamination by the user may change the waste code(s) applicable to the disposal of this product.

SECTION 14: TRANSPORT INFORMATION

DOT: PAINT RELATED MATERIAL, 3, UN1263, PGII

TDG: Paint Related Material, Class 3, UN1263, PGII

EMERGENCY RESPONSE GUIDE NUMBER: 127
Reference *North American Emergency Response Guidebook*

SECTION 15: REGULATORY INFORMATION

USA REGULATIONS

SARA SECTIONS 302 AND 304: Based on the ingredients listed in **SECTION 2**, this product does not contain any "extremely hazardous substances" listed pursuant to Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA) Section 302 or Section 304 as identified in 40 CFR Part 355, Appendix A and B.

SARA SECTIONS 311 AND 312: This product poses the following physical and health hazards as defined in 40 CFR Part 370 and is subject to the requirements of sections 311 and 312 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA):
Immediate (Acute) Health Hazard
Delayed (Chronic) Health Hazard
Fire Hazard

SARA SECTION 313: The following components are subject to the requirements of section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA) and 40 CFR Part 372.

Material	CAS
Methyl isobutyl ketone	108-10-1
Toluene	108-88-3
Methyl ethyl ketone	78-93-3
Xylene	1330-20-7
Ethylbenzene	100-41-4
Methyl alcohol	67-56-1
N-Butyl alcohol	71-36-3
Tert-Butanol	75-65-0
1,1,1-Trichloroethane	71-55-6

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Material	CAS
Methylene chloride	75-09-2
Perchloroethylene	127-18-4
Under the glycol ethers category:	
Propylene glycol methyl ether acetate	108-65-6

CERCLA: Based on the ingredients listed in **SECTION 2**, this product contains the following "hazardous substances" listed under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) in 40 CFR Part 302, Table 302.4 with the following reportable quantities (RQ):

Material	CAS	RQ
Iso-butyl acetate	110-19-0	5000 LB (2270 kg)
N-Butyl acetate	123-86-4	5000 LB (2270 kg)
Methyl isobutyl ketone	108-10-1	5000 LB (2270 kg)
Toluene	108-88-3	1000 LB (454 kg)
Methyl ethyl ketone	78-93-3	5000 LB (2270 kg)
Xylene	1330-20-7	100 LB (45.4 kg)
Ethylbenzene	100-41-4	1000 LB (454 kg)
Acetone	67-64-1	5000 LB (2270 kg)
Methyl alcohol	67-56-1	5000 LB (2270 kg)
N-Butyl alcohol	71-36-6	5000 LB (2270 kg)
Ethyl acetate	141-78-6	5000 LB (2270 kg)
1,1,1-Trichloroethane	71-55-6	1000 LB (454 kg)
Methylene chloride	75-09-2	1000 LB (454 kg)
Perchloroethylene	127-18-4	100 LB (45.4 kg)

TSCA: All the components of this product are listed on the TSCA Inventory.

CALIFORNIA: This product contains detectable amounts of benzene CAS 71-43-2, methylene chloride CAS 75-09-2, and perchloroethylene CAS 127-18-4. WARNING: These chemicals are known to the State of California to cause cancer.

This product contains detectable amounts of benzene CAS 71-43-2 and toluene CAS 108-88-3 WARNING: These chemicals are known to the State of California to cause birth defects or other reproductive harm.

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CANADIAN REGULATIONS
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS:	B2, D1A, D1B, D2A, D2B
CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA):	All the components of this product are listed on the Canadian Domestic Substances List (DSL).

SECTION 16: OTHER INFORMATION

REVISION INFORMATION:	Revised format. This MSDS has been revised in the following sections: **SECTION 2:** updated composition, added Skin-rabbit LD_{50} data. **SECTION 9:** Specific gravity, Density **SECTION 11:** Carcinogenicity, Reproductive Toxicity, Teratogenicity. **SECTION 12:** Volatile Organic Compounds
LABEL/OTHER INFORMATION:	This product is United States Department of Agriculture (USDA) approved and Underwriter's Laboratories(UL) classified.

IMMERSION CLEANER AND COLD PARTS CLEANER

MATERIAL SAFETY DATA SHEET FOR USA AND CANADA

Safety-Kleen.

SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: IMMERSION CLEANER AND COLD PARTS CLEANER

SYNONYMS: None. Also formerly known as SAFETY-KLEEN IMMERSION CLEANER, SAFETY-KLEEN IMMERSION SOLVENT, and SAFETY-KLEEN COLD PARTS CLEANER 699.

PRODUCT PART NUMBERS: 50, 699, 6861, 9699

PRODUCT USE: For cleaning carburetors and metal parts.
If this product is used in combination with other products, refer to the Material Safety Data Sheets for those products.

	24-HOUR EMERGENCY PHONE NUMBERS	
These numbers are for emergency use only. If you desire non-emergency product information, please call a phone number listed below.	**MEDICAL:** **1-800-752-7869** **Extension 2** **or** **1-312-906-6194**	**TRANSPORTATION (SPILL):** **1-800-468-1760 (USA)** **1-613-996-6666 (CANADA)** **(call collect)**

SUPPLIER: Safety-Kleen Systems, Inc.
1301 Gervais Street, Suite 300
Columbia, SC 29201
USA
1-803-933-4200

TECHNICAL INFORMATION: 1-800-669-5740, Extension 7500

MSDS FORM NUMBER: 82411

ISSUE: June 26, 2000

ORIGINAL ISSUE: December 1, 1989

SUPERSEDES: December 1, 1998

PREPARED BY: Product MSDS Coordinator

APPROVED BY: MSDS Task Force

IMMERSION CLEANER AND COLD PARTS CLEANER
MATERIAL SAFETY DATA SHEET FOR USA AND CANADA

SECTION 2: COMPOSITION/INFORMATION ON INGREDIENTS

				OSHA PEL		ACGIH TLV©			
WT%	NAME	SYNONYM	CAS NO.	TWA	STEL	TWA	STEL	LD	LC[b]
30 to 60	Solvent naphtha (petroleum), heavy arom.	Aromatic 150	64742-94-5	N. Av.[c]	N. Av.	N. Av.	N. Av.	>5000[k] mg/kg	>590 mg/m^3/4 hours
10 to 30	2-Pyrrolidinone, 1-methyl-	N-Methyl-2-pyrrolidinone; NMP	872-50-4	N. Av.[d]	N. Av.	N. Av.	N. Av.	3914[l] mg/kg	N. Av.
* 7 to 13	Propanol, 1(or 2)-(2-methoxymethylethoxy)-	Dipropylene glycol monomethyl ether	34590-94-8	100 ppm (skin)	N. Av.	100 ppm (skin)	150 ppm	5400 uL/kg[f]	N. Av.
5 to 10	Oleic acid	Z-9-Octadecenoic acid	112-80-1	5[c] mg/m^3	N. Av.	10[e] mg/m^3	N. Av.	>2000 mg/kg	N. Av.
3 to 7	Monoethanolamine	2-Amino-ethanol; MEA	141-43-5	3 ppm	N. Av.	3 ppm	6 ppm	1720[g] mg/kg	N. Av.
* 3 to 6	Naphthalene	Naphthalin	91-20-3	10 ppm	N. Av.	10 ppm (skin)	15 ppm (skin)	490[h] mg/kg	>340 mg/m^3/1 hour

N.Av. = Not Available
[a]Oral-rat LD_{50}
[b]Inhalation-rat LC_{50}
[c]Manufacturer recommended TWA = 100 ppm
[d]AIHA recommended TWA 10 ppm
[e]based on Vegetable oil mists
[f]Skin-rabbit LD_{50} 10 ml/kg
[g]Skin-rabbit LD_{50} 1 ml/kg
[h]Skin-rabbit LD_{50} > 2500 mg/kg
[k]Skin-rabbit LD_{50} >3200 mg/kg
[l]Skin-rabbit LD_{50} 8000 mg/kg

SECTION 3: HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

APPEARANCE
Liquid, clear and brown.

WARNING!

PHYSICAL HAZARD
Combustible liquid and vapor.

HEALTH HAZARDS
May be harmful if inhaled.
May burn eyes.
May burn skin.
May be harmful if absorbed through skin.
May be fatal if swallowed.
May irritate the respiratory tract (nose, throat, and lungs).
Contains material which may cause birth defects.
Contains material which may cause central nervous system, liver, kidney, lung, blood cell, eye, and skin damage.

IMMERSION CLEANER AND COLD PARTS CLEANER
MATERIAL SAFETY DATA SHEET FOR USA AND CANADA

POTENTIAL HEALTH EFFECTS

INHALATION (BREATHING): High concentrations of vapor or mist may be harmful if inhaled. Inhaling naphthalene may cause eye nerve inflammation (optic neuritis), kidney, and blood cell damage. High concentrations of vapor or mist may irritate the respiratory tract (nose, throat, and lungs). High concentrations of vapor or mist may cause nausea, vomiting, headaches, dizziness, loss of coordination, numbness, and other central nervous system effects. Massive acute overexposure may cause rapid central nervous system depression, sudden collapse, coma, and/or death.

EYES: May cause irritation, pain, and/or burns.

SKIN: May cause irritation, swelling, blistering, and/or burns. Dipropylene glycol monomethyl ether and naphthalene may be absorbed through the skin and cause harm as noted under **INHALATION (BREATHING).**

INGESTION (SWALLOWING): May be fatal if swallowed. May cause throat irritation, nausea, vomiting, and central nervous system effects as noted under **INHALATION (BREATHING)**, and/or heart injury. Monoethanolamine may burn mouth, throat, esophagus, and stomach. Breathing product into the lungs during ingestion or vomiting may cause lung injury and possible death.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Individuals with pre-existing cardiovascular, liver, kidney, respiratory tract (nose, throat, and lungs), central nervous system, eye, and/or skin disorders may have increased susceptibility to the effects of exposure.

CHRONIC: Prolonged or repeated inhalation of monoethanolamine may cause inflammation and sores in the mouth; and bronchial and/or gastrointestinal disturbances. Prolonged or repeated inhalation of naphthalene may cause cataracts and/or corneal inflammation and sores. Prolonged or repeated inhalation may cause toxic effects as noted under **INHALATION (BREATHING)**. Prolonged or repeated eye contact may cause inflammation of the membrane lining the eyelids and covering the eyeball (conjunctivitis); and/or burns. Prolonged or repeated skin contact may cause drying, cracking, redness, itching, and/or swelling (dermatitis); and/or burns.

CANCER INFORMATION: No known carcinogenicity. For more information, see **SECTION 11: CARCINOGENICITY.**

Also see **SECTION 15: CALIFORNIA.**

POTENTIAL ENVIRONMENTAL EFFECTS

Not available. Also see **SECTION 12: ECOLOGICAL INFORMATION.**

IMMERSION CLEANER AND COLD PARTS CLEANER
MATERIAL SAFETY DATA SHEET FOR USA AND CANADA

SECTION 4: FIRST AID MEASURES

INHALATION: (BREATHING) Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Oxygen should only be administered by qualified personnel. Someone should stay with victim. Get medical attention if breathing difficulty persists.

EYES: If irritation or redness from exposure to vapor develops, move away from exposure into fresh air. Upon contact, immediately flush eyes with plenty of lukewarm water, holding eyelids apart, for 15 minutes. Get medical attention.

SKIN: Remove affected clothing and shoes. Wash skin thoroughly with soap and water. Get medical attention if irritation or pain develops or persists.

INGESTION: (SWALLOWING) Do NOT induce vomiting. Immediately get medical attention. Call 1-800-752-7869, extension 2 or 1-312-906-6194 for additional information. If spontaneous vomiting occurs, keep head below hips to avoid breathing the product into the lungs. Never give anything to an unconscious person by mouth.

NOTE TO PHYSICIANS: Treat symptomatically and supportively. Administration of gastric lavage is not recommended for monoethanolamine poisoning. Treatment may vary with condition of victim and specifics of incident. Call 1-800-752-7869, extension 2 or 1-312-906-6194 for additional information.

SECTION 5: FIRE FIGHTING MEASURES

FLASH POINT: greater than 140°F (60°C) Tag Closed Cup

FLAMMABLE LIMITS IN AIR: **LOWER:** 0.8 VOL% (approximately)
UPPER: 7 VOL% (approximately)

AUTOIGNITION TEMPERATURE: 829°F (443°C) (approximately)

HAZARDOUS COMBUSTION PRODUCTS: Decomposition and combustion materials may be toxic. Burning may produce nitrogen oxides, acid halides, carbon monoxide, and unidentified organic compounds.

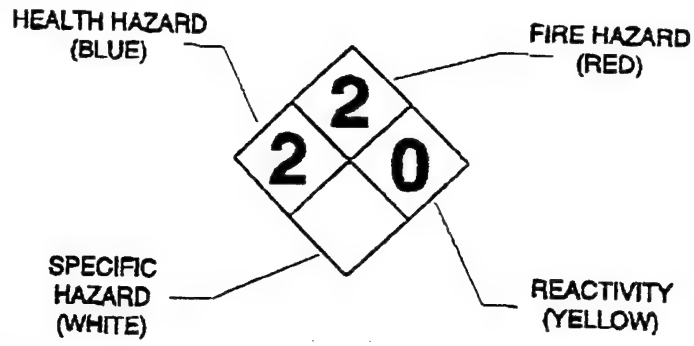
CONDITIONS OF FLAMMABILITY: Heat, sparks, or flame.

EXTINGUISHING MEDIA: Carbon dioxide, alcohol-resistant foam, dry chemical, water spray, or water fog.

IMMERSION CLEANER AND COLD PARTS CLEANER
MATERIAL SAFETY DATA SHEET FOR USA AND CANADA

NFPA 704 HAZARD IDENTIFICATION:

This information is intended solely for the use by individuals trained in this system.



FIRE FIGHTING INSTRUCTIONS:

Keep storage containers cool with water spray.
A positive-pressure, self-contained breathing apparatus (SCBA) and full-body protective equipment are required for fire emergencies.

FIRE AND EXPLOSION HAZARDS:

Vapor explosion hazard indoors, outdoors, or in sewers. Vapors may travel to ignition source and flashback. Vapors will spread along the ground and collect in low or confined areas. Run-off to sewer may create a fire hazard. Heated containers may rupture. "Empty" containers may retain residue and can be dangerous. Product may be sensitive to static discharge, which could result in fire or explosion.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Remove all ignition sources. Do not touch or walk through spilled product. Stop leak if you can do it without risk. Wear protective equipment and provide engineering controls as specified in **SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION**. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Ventilate area and avoid breathing vapor or mist. A vapor suppressing foam may be used to reduce vapors. Contain spill away from surface waters and sewers. Contain spill as a liquid for possible recovery or sorb with compatible sorbent material and shovel with a clean, sparkproof tool into a sealable container for disposal.

Additionally, for large spills: Water spray may reduce vapor, but may not prevent ignition in closed spaces. Dike far ahead of liquid spill for collection and later disposal.

There may be specific federal regulatory reporting requirements associated with spills, leaks, or releases of this product. Also see **SECTION 15: REGULATORY INFORMATION.**

IMMERSION CLEANER AND COLD PARTS CLEANER
MATERIAL SAFETY DATA SHEET FOR USA AND CANADA

SECTION 7: HANDLING AND STORAGE

HANDLING: Keep away from heat, sparks, or flame. Where flammable mixtures may be present, equipment safe for such locations should be used. Use clean, sparkproof tools and explosion-proof equipment. When transferring product, metal containers, including trucks and tank cars, should be grounded and bonded. Do not breathe vapor or mist. Use in a well ventilated area. Avoid contact with eyes, skin, clothing, and shoes. Do not smoke while using this product.

SHIPPING AND STORING: Keep container tightly closed when not in use and during transport. Do not pressurize, cut, weld, braze, solder, drill, or grind containers. Keep containers away from heat, flame, sparks, static electricity, or other sources of ignition. Empty product containers may retain product residue and can be dangerous. See **SECTION 14: TRANSPORT INFORMATION** for Packing Group information.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS: Provide general ventilation needed to maintain concentration of vapor or mist below applicable exposure limits. Where adequate general ventilation is unavailable, use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Where explosive mixtures may be present, equipment safe for such locations should be used.

PERSONAL PROTECTIVE EQUIPMENT

RESPIRATORY PROTECTION: Use NIOSH-certified, full-face, air-purifying respiratory protective equipment with organic vapor cartridges when concentration of vapor or mist exceeds applicable exposure limits. Protection provided by air-purifying respirators is limited. Selection and use of respiratory protective equipment should be in accordance in the USA with OSHA General Industry Standard 29 CFR 1910.134; or in Canada with CSA Standard Z94.4.

EYE PROTECTION: Where eye contact is likely, wear chemical goggles; contact lens use is not recommended.

SKIN PROTECTION: Where skin contact is likely, wear laminate (Ansell Edmont Barrier®, North Silver Shield®, Safety 4 4h®) or equivalent protective gloves; use of neoprene, natural rubber, or equivalent gloves is not recommended.

To avoid prolonged or repeated contact where spills and splashes are likely, wear appropriate chemical-resistant faceshield, boots, apron, whole body suits, or other protective clothing.

PERSONAL HYGIENE: Use good personal hygiene. Wash thoroughly with soap and water after handling product and before eating, drinking, or using tobacco products. Clean affected clothing, shoes, and protective equipment before reuse. Discard affected clothing, shoes, or protective equipment if they cannot be thoroughly cleaned. Discard leather articles, such as shoes, saturated with the product.

OTHER PROTECTIVE EQUIPMENT: Where spills and splashes are likely, facilities storing or using this product should be equipped with an emergency eyewash and shower, both equipped with clean water, in the immediate work area.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE, APPEARANCE, AND ODOR:	Liquid, clear and brown.
ODOR THRESHOLD:	Not available.
MOLECULAR WEIGHT:	Not available.
SPECIFIC GRAVITY:	0.95 (water = 1)
DENSITY:	7.9 LB/US gal (950 g/l)
VAPOR DENSITY:	4.4 (air = 1)
VAPOR PRESSURE:	less than 0.4 mm Hg at 68°F (20°C)
BOILING POINT:	340°F (171°C) (initial)
FREEZING/MELTING POINT:	less than 10°F (-12°C)
pH:	11
EVAPORATION RATE:	1 (butyl acetate = 1)
SOLUBILITY IN WATER:	Complete.
FLASH POINT:	greater than 140°F (60°C) Tag Closed Cup
FLAMMABLE LIMITS IN AIR:	**LOWER:** 0.8 VOL% (approximately) **UPPER:** 7 VOL% (approximately)

AUTOIGNITION TEMPERATURE: 829°F (443°C) (approximately)

SECTION 10: STABILITY AND REACTIVITY

STABILITY: Stable under normal temperatures and pressures. Avoid heat, sparks, or flame.

INCOMPATIBILITY: Avoid acids, oxidizing agents, reactive halogens, or reactive metals. Oleic acid can react with perchlorates or perchloric acid to form explosive products.

REACTIVITY: Polymerization is not known to occur under normal temperatures and pressures. Not reactive with water.

HAZARDOUS DECOMPOSITION PRODUCTS: None under normal temperatures and pressures. See also **SECTION 5: HAZARDOUS COMBUSTION PRODUCTS**.

SECTION 11: TOXICOLOGICAL INFORMATION

SENSITIZATION: Aromatic 150 has demonstrated human effects of skin photosensitization.

Based on best current information, the other components listed in **SECTION 2** are not sensitizers.

MUTAGENICITY: Ethanolamine has demonstrated human effects of mutagenicity. Aromatic 150 and naphthalene have demonstrated animal effects of mutagenicity. 1-Methyl-pyrrolidinone and oleic acid have demonstrated experimental effects of mutagenicity.

Based on best current information, the other component listed in **SECTION 2** is not a mutagen.

CARCINOGENICITY: Based on best current information, there is no known carcinogenicity as regulated by OSHA; as categorized by ACGIH A1 or A2 substances; as categorized by IARC Group 1, Group 2A, or Group 2B agents; or as listed by NTP as either known carcinogens or substances for which there is limited evidence of carcinogenicity in humans or sufficient evidence of carcinogenicity in experimental animals.

Also see **SECTION 15: CALIFORNIA.**

REPRODUCTIVE TOXICITY: 1-Methyl-pyrrolidinone and ethanolamine have demonstrated experimental effects of reproductive toxicity.

Based on best current information, the other components listed in **SECTION 2** are not reproductive toxicants.

Also see **SECTION 15: CALIFORNIA.**

TERATOGENICITY: Naphthalene and ethanolamine have demonstrated animal effects of teratogenicity.

Based on best current information, the other components listed in **SECTION 2** are not teratogens.

TOXICOLOGICALLY SYNERGISTIC PRODUCT(S): Based on best current information, there are no known toxicologically synergistic products associated with this product.

SECTION 12: ECOLOGICAL INFORMATION

ECOTOXICITY: Not available.

OCTANOL/WATER PARTITION COEFFICIENT: Not available.

VOLATILE ORGANIC COMPOUNDS: 92 WT%; 7.3 LB/US gal; 874 g/l
As per 40 CFR Part 51.100(s).

SECTION 13: DISPOSAL CONSIDERATIONS

DISPOSAL: Dispose in accordance with federal, state, provincial, and local regulations. Regulations may also apply to empty containers. The responsibility for proper waste disposal lies with the owner of the waste. Contact Safety-Kleen regarding recycling or proper disposal.

USEPA WASTE CODE(S): This product, if discarded, is not expected to be a characteristic or listed hazardous waste. Processing, use, or contamination by the user may change the waste code(s) applicable to the disposal of this product.

SECTION 14: TRANSPORT INFORMATION

DOT: CORROSIVE LIQUID, BASIC, ORGANIC, N.O.S. (MONOETHANOLAMINE), 8, UN3267, PGIII

TDG: Corrosive Liquids, N.O.S., Class 8 (9.2), UN1760, PGIII (Monoethanolamine)

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EMERGENCY RESPONSE GUIDE NUMBER: 132
Reference *North American Emergency Response Guidebook*

SECTION 15: REGULATORY INFORMATION

USA REGULATIONS

SARA SECTIONS 302 AND 304: Based on the ingredients listed in **SECTION 2**, this product does not contain any "extremely hazardous substances" listed pursuant to Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA) Section 302 or Section 304 as identified in 40 CFR Part 355, Appendix A and B.

SARA SECTIONS 311 AND 312: This product poses the following physical and health hazards as defined in 40 CFR Part 370 and is subject to the requirements of sections 311 and 312 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA):

Immediate (Acute) Health Hazard
Delayed (Chronic) Health Hazard
Fire Hazard

SARA SECTION 313: The following components are subject to the requirements of section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA) and 40 CFR Part 372.

Material	CAS
2-Pyrrolidinone, 1-methyl-	872-50-4
Naphthalene	91-20-3

CERCLA: Based on the ingredients listed in **SECTION 2**, this product contains the following "hazardous substance" listed under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) in 40 CFR Part 302, Table 302.4 with the following reportable quantity (RQ):

Material	CAS	RQ
Naphthalene	91-20-3	100 LB (45.4 kg)

TSCA: All the components of this product are listed on the TSCA Inventory.

IMMERSION CLEANER AND COLD PARTS CLEANER MATERIAL SAFETY DATA SHEET FOR USA AND CANADA

CALIFORNIA: This product contains detectable amounts of arsenic CAS 7440-38-2, benzene CAS 71-43-2, cadmium CAS 7440-43-9, chromium CAS 7440-47-3, lead CAS 7439-92-1, methylene chloride CAS 75-09-2, perchloroethylene CAS 127-18-4, trichloroethylene CAS 79-01-6, dichlorobenzene, para- CAS 106-46-7, beryllium CAS 7440-41-7, and mercury CAS 7439-97-6. WARNING: These chemicals are known to the State of California to cause cancer.

This product contains detectable amounts of arsenic CAS 7440-38-2, benzene CAS 71-43-2, cadmium CAS 7440-43-9, mercury CAS 7439-97-6, lead CAS 7439-92-1, and toluene CAS 108-88-3. WARNING: These chemicals are known to the State of California to cause birth defects or other reproductive harm.

CANADIAN REGULATIONS

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS: B3, D2A, E

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA): All the components of this product are listed on the Canadian Domestic Substances List (DSL).

SECTION 16: OTHER INFORMATION

REVISION INFORMATION: This MSDS has been revised in the following sections: **SECTION 2, SECTION 11**

LABEL/OTHER INFORMATION: This product is Underwriter's Laboratories (UL) classified.

SAFETY-KLEEN PREMIUM SOLVENT
SAFETY-KLEEN PREMIUM GOLD SOLVENT

safety-kleen.

MATERIAL SAFETY DATA SHEET FOR USA AND CANADA

SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: SAFETY-KLEEN PREMIUM SOLVENT
SAFETY-KLEEN PREMIUM GOLD SOLVENT

SYNONYMS: Parts Washer Solvent; Petroleum Distillates; Petroleum Naptha; Naptha, Solvent; Stoddard Solvent; Mineral Spirits.

PRODUCT PART NUMBERS: 6605, 6638.

PRODUCT USE: Cleaning and degreasing metal parts.
If these products are used in combination with other products, refer to the Material Safety Data Sheets for those products.

	24-HOUR EMERGENCY PHONE NUMBERS	
These numbers are for emergency use only. If you desire non-emergency product information, please call a phone number listed below.	**MEDICAL:**	**TRANSPORTATION (SPILL):**
	1-800-752-7869 Extension 2 or 1-312-906-6194	**1-800-468-1760 (USA)**
		1-613-996-6666 (CANADA) (call collect)

SUPPLIER: Safety-Kleen Corp.
1301 Gervais Street, Suite 300
Columbia, SC 29201
USA
1-803-933-4200

TECHNICAL INFORMATION: **1-800-669-5740, Extension 7500**

MSDS FORM NUMBER: 82658 (Also formerly known as 82529) **ISSUE:** March 24, 2000

ORIGINAL ISSUE: January 26, 1995 (Also formerly January 7, 1993) **SUPERSEDES:** April 4, 1997

PREPARED BY: Product MSDS Coordinator **APPROVED BY:** MSDS Task Force

SAFETY-KLEEN PREMIUM SOLVENT
SAFETY-KLEEN PREMIUM GOLD SOLVENT
MATERIAL SAFETY DATA SHEET FOR USA AND CANADA

SECTION 2: COMPOSITION/INFORMATION ON INGREDIENTS

WT%	NAME	SYNONYM	CAS NO.	OSHA PEL TWA	OSHA PEL STEL	ACGIH TLV® TWA	ACGIH TLV® STEL	LD[a]	LC[b]
100	Distillates (petroleum), hydrotreated light[e]	N.Av.	64742-47-8	500[d] ppm	N.Av.	100[d] ppm	N.Av.	>5000[c]	>5500[d] mg/m^3/4 hours

N.Av. = Not Available
[a]Oral-Rat LD (mg/kg)
[b]Inhalation-Rat LC

[c]Based on Stoddard solvent: Skin-Rabbit LD_{50} >3000 mg/kg
[d]Based on Stoddard Solvent.

[e]Based on Stoddard Solvent, NIOSH IDLH (Immediately Dangerous to Life or Health): 20000 mg/m^3 (5000 ppm)

SECTION 3: HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

APPEARANCE
Liquid, clear, colorless to pale yellow, mild hydrocarbon odor.

WARNING!

PHYSICAL HAZARD
Combustible liquid and vapor.

HEALTH HAZARDS
May be harmful if inhaled.
May irritate eyes and skin.
May be harmful if swallowed.
Contains material which may cause central nervous system damage.

ENVIRONMENTAL HAZARDS
Not toxic to aquatic life.

POTENTIAL HEALTH EFFECTS

INHALATION (BREATHING): High concentrations of vapor or mist may be harmful if inhaled. High concentrations of vapor or mist may irritate the respiratory tract (nose, throat, and lungs). High concentrations of vapor or mist may cause nausea, vomiting, headaches, dizziness, loss of coordination, numbness, and other central nervous system effects. Massive acute overexposure may cause rapid central nervous system depression, sudden collapse, coma, and/or death.

EYES: May cause irritation with watering, stinging, and/or redness.

SKIN: May cause irritation. Not likely to be absorbed through the skin in harmful amounts.

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INGESTION (SWALLOWING): May be harmful if swallowed. May cause throat irritation, nausea, vomiting, and central nervous system effects as noted under **INHALATION (BREATHING)**. Breathing product into the lungs during ingestion or vomiting may cause lung injury and possible death.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Individuals with pre-existing respiratory tract (nose, throat, and lungs), central nervous system, eye, and/or skin disorders may have increased susceptibility to the effects of exposure.

CHRONIC: Prolonged or repeated inhalation may cause toxic effects as noted under **INHALATION (BREATHING)**. Prolonged or repeated inhalation and/or ingestion has been suggested to produce kidney toxicity in dogs but in no other species, including humans. According to one unsubstantiated human case report, prolonged or repeated inhalation, skin contact, and/or ingestion may cause mild, acute chemical hepatitis and acute, yellow atrophy (size reduction) of the liver. Prolonged or repeated eye contact may cause inflammation of the membrane lining the eyelids and covering the eyeball (conjunctivitis). Prolonged or repeated skin contact may cause drying, cracking, redness, itching, and/or swelling (dermatitis); and/or burns.

CANCER INFORMATION: No known carcinogenicity. For more information, see **SECTION 11: CARCINOGENICITY**.

Also see **SECTION 15: CALIFORNIA**.

POTENTIAL ENVIRONMENTAL EFFECTS
Product is not toxic to aquatic life. Also see **SECTION 12: ECOLOGICAL INFORMATION**.

SECTION 4: FIRST AID MEASURES

INHALATION: (BREATHING) Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Oxygen should only be administered by qualified personnel. Someone should stay with victim. Get medical attention if breathing difficulty persists.

EYES: If irritation or redness from exposure to vapor develops, move away from exposure into fresh air. Upon contact, immediately flush eyes with plenty of lukewarm water, holding eyelids apart, for 15 minutes. Get medical attention.

SKIN: Remove affected clothing and shoes. Wash skin thoroughly with soap and water. Get medical attention if irritation or pain develops or persists.

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INGESTION: (SWALLOWING) Do NOT induce vomiting. Immediately get medical attention. Call 1-800-752-7869, extension 2 or 1-312-906-6194 for additional information. If spontaneous vomiting occurs, keep head below hips to avoid breathing the product into the lungs. Never give anything to an unconscious person by mouth.

NOTE TO PHYSICIANS: Treat symptomatically and supportively. Administration of gastric lavage, if warranted, should be performed by qualified medical personnel. Treatment may vary with condition of victim and specifics of incident. Call 1-800-752-7869, extension 2 or 1-312-906-6194 for additional information.

SECTION 5: FIRE FIGHTING MEASURES

FLASH POINT: 148°F (64°C) (approximately) Tag Closed Cup

FLAMMABLE LIMITS IN AIR: **LOWER:** 0.7 VOL% (minimum)
UPPER: 5 VOL% (maximum)

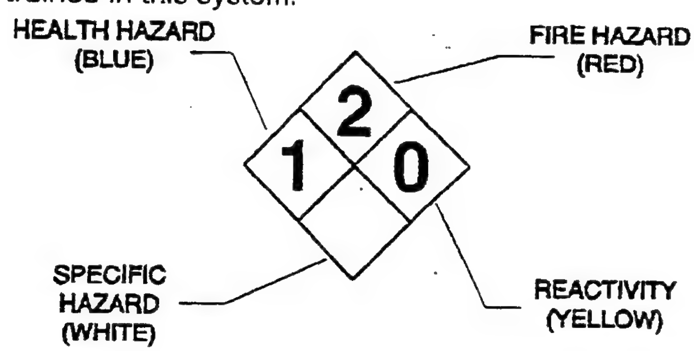
AUTOIGNITION TEMPERATURE: 410°F (210°C) (minimum)

HAZARDOUS COMBUSTION PRODUCTS: Decomposition and combustion materials may be toxic. Burning may produce carbon monoxide and unidentified organic compounds.

CONDITIONS OF FLAMMABILITY: Heat, sparks, or flame.

EXTINGUISHING MEDIA: Carbon dioxide, regular foam, dry chemical, water spray, or water fog.

NFPA 704 HAZARD IDENTIFICATION: This information is intended solely for the use by individuals trained in this system.



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FIRE FIGHTING INSTRUCTIONS: Keep storage containers cool with water spray. A positive-pressure, self-contained breathing apparatus (SCBA) and full-body protective equipment are required for fire emergencies.

FIRE AND EXPLOSION HAZARDS: Vapor explosion hazard indoors, outdoors, or in sewers. Vapors may travel to ignition source and flashback. Vapors will spread along the ground and collect in low or confined areas. Run-off to sewer may create a fire hazard. Heated containers may rupture. "Empty" containers may retain residue and can be dangerous. Not sensitive to mechanical impact. Product may be sensitive to static discharge, which could result in fire or explosion.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Remove all ignition sources. Do not touch or walk through spilled product. Stop leak if you can do it without risk. Wear protective equipment and provide engineering controls as specified in **SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION**. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Ventilate area and avoid breathing vapor or mist. A vapor suppressing foam may be used to reduce vapors. Contain spill away from surface waters and sewers. Contain spill as a liquid for possible recovery or sorb with compatible sorbent material and shovel with a clean, sparkproof tool into a sealable container for disposal.

Additionally, for large spills: Water spray may reduce vapor, but may not prevent ignition in closed spaces. Dike far ahead of liquid spill for collection and later disposal.

SECTION 7: HANDLING AND STORAGE

HANDLING: Keep away from heat, sparks, or flame. Where flammable mixtures may be present, equipment safe for such locations should be used. Use clean, sparkproof tools and explosion-proof equipment. When transferring product, metal containers, including trucks and tank cars, should be grounded and bonded. Do not breathe vapor or mist. Use in a well ventilated area. Avoid contact with eyes, skin, clothing, and shoes. Do not smoke while using these products.

SHIPPING AND STORING: Keep container tightly closed when not in use and during transport. Do not pressurize, cut, weld, braze, solder, drill, or grind containers. Keep containers away from heat, flame, sparks, static electricity, or other sources of ignition. Empty product containers may retain product residue and can be dangerous. See **SECTION 14: TRANSPORT INFORMATION** for Packing Group information.

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SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS: Provide general ventilation needed to maintain concentration of vapor or mist below applicable exposure limits. Where adequate general ventilation is unavailable, use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Where explosive mixtures may be present, equipment safe for such locations should be used.

PERSONAL PROTECTIVE EQUIPMENT

RESPIRATORY PROTECTION: Use NIOSH-certified, air-purifying respirators with organic vapor cartridges respiratory protective equipment when concentration of vapor or mist exceeds applicable exposure limits. Protection provided by air-purifying respirators is limited. Selection and use of respiratory protective equipment should be in accordance in the USA with OSHA General Industry Standard 29 CFR 1910.134; or in Canada with CSA Standard Z94.4.

EYE PROTECTION: Where eye contact is likely, wear chemical goggles; contact lens use is not recommended.

SKIN PROTECTION: Where skin contact is likely, wear nitrile, supported neoprene, Viton®, polyvinyl alcohol (PVA), laminate (such as North Silver Shield®, Safety 4 4h®, Ansell Edmont Barrier®), or equivalent protective gloves; use of polyvinyl chloride (PVC), natural rubber (latex), or equivalent gloves is not recommended.

To avoid prolonged or repeated contact where spills and splashes are likely, wear appropriate chemical-resistant faceshield, boots, apron, whole body suits, or other protective clothing.

PERSONAL HYGIENE: Use good personal hygiene. Wash thoroughly with soap and water after handling product and before eating, drinking, or using tobacco products. Clean affected clothing, shoes, and protective equipment before reuse. Discard affected clothing, shoes, or protective equipment if they cannot be thoroughly cleaned. Discard leather articles, such as shoes, saturated with the product.

OTHER PROTECTIVE EQUIPMENT: Where spills and splashes are likely, facilities storing or using this product should be equipped with an emergency eyewash and shower, both equipped with clean water, in the immediate work area.

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SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE, APPEARANCE, AND ODOR:	Liquid, clear, colorless to pale yellow, mild hydrocarbon odor.
ODOR THRESHOLD:	30 ppm (based on Stoddard Solvent)
MOLECULAR WEIGHT:	Not available.
SPECIFIC GRAVITY:	0.78 to 0.82 at 60°F/60°F (15.6°C/15.6°C) (water = 1)
DENSITY:	6.5 to 6.8 LB/US gal (780 to 820 g/l)
VAPOR DENSITY:	5 (air = 1) (approximately)
VAPOR PRESSURE:	0.2 mm Hg at 68°F (20°C) (approximately) 0.6 mm Hg at 100°F (38°C) (approximately)
BOILING POINT:	350°F (177°C) (initial)
FREEZING/MELTING POINT:	-45°F (-43°C) (maximum)
pH:	Not applicable.
EVAPORATION RATE:	0.1 (butyl acetate = 1) (based on Stoddard Solvent)
SOLUBILITY IN WATER:	Insoluble.
FLASH POINT:	148°F (64°C) (approximately) Tag Closed Cup
FLAMMABLE LIMITS IN AIR:	**LOWER:** 0.7 VOL% (minimum) **UPPER:** 5 VOL% (maximum)
AUTOIGNITION TEMPERATURE:	410°F (210°C) (minimum)

SECTION 10: STABILITY AND REACTIVITY

STABILITY: Stable under normal temperatures and pressures. Avoid heat, sparks, or flame.

INCOMPATIBILITY: Avoid acids, alkalies, oxidizing agents, reducing agents, or reactive halogens.

REACTIVITY: Polymerization is not known to occur under normal temperatures and pressures. Not reactive with water.

HAZARDOUS DECOMPOSITION PRODUCTS: None under normal temperatures and pressures. See also **SECTION 5: HAZARDOUS COMBUSTION PRODUCTS**.

SECTION 11: TOXICOLOGICAL INFORMATION

SENSITIZATION: Based on best current information, there is no known human sensitization associated with these products.

MUTAGENICITY: Based on best current information, there is no known mutagenicity associated with these products.

CARCINOGENICITY: Based on best current information, there is no known carcinogenicity as regulated by OSHA; as categorized by ACGIH A1 or A2 substances; as categorized by IARC Group 1, Group 2A, or Group 2B agents; or as listed by NTP as either known carcinogens or substances for which there is limited evidence of carcinogenicity in humans or sufficient evidence of carcinogenicity in experimental animals.

Also see **SECTION 15: CALIFORNIA.**

REPRODUCTIVE TOXICITY: Based on best current information, there is no known reproductive toxicity associated with these products.

Also see **SECTION 15: CALIFORNIA.**

TERATOGENICITY: Based on best current information, there is no known teratogenicity associated with these products.

TOXICOLOGICALLY SYNERGISTIC PRODUCT(S): Based on best current information, there are no known toxicologically synergistic products associated with these products.

SECTION 12: ECOLOGICAL INFORMATION

ECOTOXICITY: A Static Acute Bioassay as per the California Department of Fish and Game WPCL, was done using fathead minnows, and up to 750 ppm of the products in water.

The material passed the bioassay with only 1 out of 10 minnows dying. To fail the bioassay, more than 40% of the fish would die in 750 ppm.

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OCTANOL/WATER PARTITION COEFFICIENT:	Not available.
VOLATILE ORGANIC COMPOUNDS:	100 WT%; 6.5 to 6.8 LB/US gal; 780 to 820 g/l As per 40 CFR Part 51.100(s).

SECTION 13: DISPOSAL CONSIDERATIONS

DISPOSAL: Dispose in accordance with federal, state, provincial, and local regulations. Regulations may also apply to empty containers. The responsibility for proper waste disposal lies with the owner of the waste. Contact Safety-Kleen regarding recycling or proper disposal.

USEPA WASTE CODE(S): Not regulated.
Based on available data, this information applies to the product as supplied to the user. Processing, use, or contamination by the user may change the waste code(s) applicable to the disposal of these products.

SECTION 14: TRANSPORT INFORMATION

DOT:	COMBUSTIBLE LIQUID, N.O.S. (PETROLEUM NAPHTHA), NA1993, PG III
TDG:	Not regulated.
EMERGENCY RESPONSE GUIDE NUMBER:	128 Reference *North American Emergency Response Guidebook*

SECTION 15: REGULATORY INFORMATION

USA REGULATIONS

SARA SECTIONS 302 AND 304: Based on the ingredient listed in **SECTION 2**, these products do not contain any "extremely hazardous substances" listed pursuant to Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA) Section 302 or Section 304 as identified in 40 CFR Part 355, Appendix A and B.

SARA SECTIONS 311 AND 312: These products pose the following physical and health hazards as defined in 40 CFR Part 370 and are subject to the requirements of sections 311 and 312 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA):

Immediate (Acute) Health Hazard
Delayed (Chronic) Health Hazard
Fire Hazard

SAFETY-KLEEN PREMIUM SOLVENT
SAFETY-KLEEN PREMIUM GOLD SOLVENT
MATERIAL SAFETY DATA SHEET FOR USA AND CANADA

SARA SECTION 313: These products do not contain toxic chemicals subject to the requirements of section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA) and 40 CFR Part 372.

CERCLA: Based on the ingredient listed in **SECTION 2,** these products do not contain any "hazardous substance" listed pursuant to the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) in 40 CFR Part 302, Table 302.4.

TSCA: All the components of these products are listed on the TSCA Inventory.

CALIFORNIA: These products may contain detectable amounts of benzene CAS 71-43-2 (at or below 0.4 mg/L) and p-dichlorobenzene CAS 106-46-7 (at or below 5 mg/L). WARNING: These chemicals are known to the State of California to cause cancer.

These products may contain detectable amounts of benzene CAS 71-43-2 (at or below 0.4 mg/L) and toluene CAS 108-88-3 (at or below 30 mg/L). WARNING: These chemicals are known to the State of California to cause birth defects or other reproductive harm.

CANADIAN REGULATIONS

These products have been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS: B3, D2B

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA): All the components of these products are listed on the Canadian Domestic Substances List (DSL).

SAFETY-KLEEN PREMIUM SOLVENT
SAFETY-KLEEN PREMIUM GOLD SOLVENT
MATERIAL SAFETY DATA SHEET FOR USA AND CANADA

SECTION 16: OTHER INFORMATION

REVISION INFORMATION: Revised format. This MSDS has been revised in the following sections:

SECTION 1: added SAFETY-KLEEN PREMIUM SOLVENT product
SECTION 3: Emergency Overview, Inhalation, Chronic
SECTION 4: Ingestion
SECTION 5: Upper Flammable Limit, Autoignition Temperature
SECTION 8: Skin Protection
SECTION 9: Molecular Weight
SECTION 12: Ecotoxicity

LABEL/OTHER INFORMATION: These products are United States Department of Agriculture (USDA) approved and Underwriter's Laboratories (UL) classified.

The ArmaKleen Company

AquaWorks® MPC Cleaning Solution
MATERIAL SAFETY DATA SHEET FOR USA AND CANADA

SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: **AquaWorks®MPC Cleaning Solution**

SYNONYM(S): Not available

PRODUCT PART NUMBER: 6321

PRODUCT USE: Aqueous alkaline cleaning solution for the removal of grease, oil, dirt, dust, grime, and other soils from a variety of metal and non-metal surfaces. If this product is used in combination with other products, refer to the Material Safety Data Sheets for those products.

24-HOUR EMERGENCY TELEPHONES

These numbers are for emergency use only. If you desire non-emergency product information, please call a telephone number listed below.	**MEDICAL:** **1-800-752-7869** **Extension 2** **or** **1-312-906-6194**	**TRANSPORTATION (SPILL):** **1-800-468-1760 (USA)** **1-613-996-6666 (CANADA)** **(call collect)**

MANUFACTURER:
The ArmaKleen Company
469 North Harrison Street
Princeton, NJ 08543
USA
(609) 683-5900

SUPPLIER:
Safety-Kleen Corp.
1301 Gervais Street, Suite 300
Columbia, SC 29201
USA
1-803-933-4200

TECHNICAL INFORMATION: 1-800-824-0866

SAFETY-KLEEN MSDS FORM NUMBER: 82783
The ArmaKleen Company MSDS NUMBER: 803

ISSUE: Original

ORIGINAL ISSUE: July 9, 1999

SUPERSEDES: New

PREPARED BY: Product MSDS Coordinator

APPROVED BY: MSDS Task Force

AquaWorks® MPC Cleaning Solution
MATERIAL SAFETY DATA SHEET FOR USA AND CANADA

SECTION 2: COMPOSITION/INFORMATION ON INGREDIENTS

				OSHA PEL		ACGIH TLV®			
WT%	NAME	SYNONYM	CAS NO.	TWA	STEL	TWA	STEL	LD[a]	LC[b]
0.5 to 1.5	Sodium carbonate monohydrate	Soda ash	497-19-8	N.Av.	N.Av.	N.Av.	$10 mg/m^3$,[c]	>3000	N.Av.
0.5 to 1.5	Alcohols, C9-C11, ethoxylated	Linear primary alcohol ethoxylate	68439-46-3	N.Av.	N.Av.	N.Av.	N.Av.	>2700	N.Av.
0.5 to 1.5	3,5,5-trimethylhexanoic acid	Isononanoic acid	3302-10-1	N.Av.	N.Av.	N.Av.	N.Av.	N.Av.	N.Av.

N.Av. - Not Available [a]Oral-Rat LD_{50}(mg/kg) [b]Inhalation LC [c]Particulates Not Otherwise Classified (PNOC)

SECTION 3: HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

APPEARANCE
Liquid, clear, light amber color, mild detergent odor.

CAUTION!

HEALTH HAZARDS
May irritate the respiratory tract (nose, throat, and lungs), eyes, skin, and digestive tract.

POTENTIAL HEALTH EFFECTS

INHALATION (BREATHING): High concentrations of vapor or mist may irritate the respiratory tract (nose, throat, and lungs).

EYES: May cause slight to moderate irritation.

SKIN: May cause slight to moderate irritation. Not likely to be absorbed through the skin in harmful amounts.

INGESTION (SWALLOWING): May irritate the digestive tract.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Individuals with pre-existing respiratory tract (nose, throat, and lungs), eye, and/or skin disorders may have increased susceptibility to the effects of exposure.

CHRONIC: Prolonged or repeated eye contact may cause inflammation of the membrane lining the eyelids and covering the eyeball (conjunctivitis). Prolonged or repeated skin contact may cause drying, cracking, redness, itching, and/or swelling (dermatitis).

CANCER INFORMATION: No known carcinogenicity. For more information, see **SECTION 11: CARCINOGENCITY.**

POTENTIAL ENVIRONMENTAL EFFECTS
Not available. Also see **SECTION 12: ECOLOGICAL INFORMATION.**

SECTION 4: FIRST AID MEASURES

INHALATION: (BREATHING) Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Oxygen should only be administered by qualified personnel. Someone should stay with victim. Get medical attention if breathing difficulty persists.

EYES: If irritation or redness from exposure to vapor develops, move away from exposure into fresh air. Upon contact, immediately flush eyes with plenty of lukewarm water, holding eyelids apart, for 15 minutes. Get medical attention.

SKIN: Remove contaminated clothing and shoes. Wash skin thoroughly with soap and water. Get medical attention if irritation or pain develops or persists.

INGESTION: (SWALLOWING) Immediately get medical attention. Call medical emergency telephone number (see **SECTION 1**) for additional information. Do NOT induce vomiting. If spontaneous vomiting occurs, keep head below hips to avoid breathing the product into the lungs. Never give anything to an unconscious person by mouth.

NOTE TO PHYSICIANS: Treat symptomatically and supportively. Ingesting large amounts of product may cause systemic alkalosis. Treatment may vary with condition of victim and specifics of incident. Call medical emergency telephone number (see **SECTION 1**) for additional information.

SECTION 5: FIRE FIGHTING MEASURES

FLASH POINT: >212°F (>100°C)

FLAMMABLE LIMITS IN AIR: Not applicable

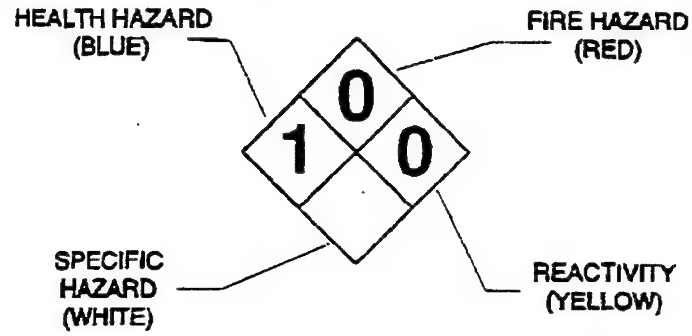
AUTOIGNITION TEMPERATURE: Not applicable.

HAZARDOUS COMBUSTION PRODUCTS: Product itself does not burn, but may decompose upon heating to produce carbon monoxide, carbon dioxide, sulfur oxides, and nitrogen oxides.

CONDITIONS OF FLAMMABILITY: Product will not burn.

EXTINGUISHING MEDIA: Not applicable.

NFPA 704 HAZARD IDENTIFICATION: This information is intended solely for the use by individuals trained in this system.



FIRE FIGHTING INSTRUCTIONS: Keep storage containers cool with water spray. A positive-pressure, self-contained breathing apparatus (SCBA) and full-body protective equipment are required for fire emergencies.

FIRE AND EXPLOSION HAZARDS: Heated containers may rupture. "Empty" containers may retain residue and can be dangerous. Not sensitive to mechanical impact or static discharge.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Spilled product is slippery. Do not touch or walk through spilled product. Stop leak if you can do it without risk. Wear protective equipment and provide engineering controls as specified in **SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION**. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Ventilate area and avoid breathing vapor or mist. Contain away from surface waters and sewers. Contain spill as a liquid for possible recovery or sorb with compatible sorbent material and shovel with a clean tool into a sealable container for disposal.

Additionally, for large spills: Dike far ahead of liquid spill for collection and later disposal.

There may be specific regulatory reporting requirements associated with spills, leaks, or releases of this product. Also see **SECTION 15: REGULATORY INFORMATION.**

SECTION 7: HANDLING AND STORAGE

HANDLING: Use clean tools. Do not breathe vapor or mist. Use in a well ventilated area. Avoid contact with eyes, skin, clothing, and shoes.

SHIPPING AND STORING: Keep container tightly closed when not in use and during transport. Store containers in a cool, dry place. Empty product containers may retain product residue and can be dangerous.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS: Provide general ventilation needed to maintain concentration of vapor or mist below applicable exposure limits. Where adequate general ventilation is unavailable, use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits.

PERSONAL PROTECTIVE EQUIPMENT

RESPIRATORY PROTECTION: Use NIOSH-certified, combination N-, P-, or R- series particulate filter respiratory protective equipment when concentration of vapor or mist exceeds applicable exposure limits. Selection and use of respiratory protective equipment should be in accordance in the USA with OSHA General Industry Standard 29 CFR 1910.134; or in Canada with CSA Standard Z94.4.

EYE PROTECTION: Where eye contact is likely, wear chemical goggles; contact lens use is not recommended.

SKIN PROTECTION: Where skin contact is likely, wear nitrile, neoprene, or equivalent protective gloves; use of polyvinyl alcohol (PVA) or equivalent gloves is not recommended.

To avoid prolonged or repeated contact where spills and splashes are likely, wear appropriate chemical-resistant faceshield, boots, apron, whole body suits, or other protective clothing.

PERSONAL HYGIENE: Use good personal hygiene. Wash thoroughly with soap and water after handling and before eating, drinking, or using tobacco products. Clean contaminated clothing, shoes, and protective equipment before reuse. Discard contaminated clothing, shoes, or protective equipment if they cannot be thoroughly cleaned. Discard leather articles, such as shoes, saturated with the product.

AquaWorks® MPC Cleaning Solution
MATERIAL SAFETY DATA SHEET FOR USA AND CANADA

OTHER PROTECTIVE EQUIPMENT:	Where spills and splashes are likely, facilities storing or using this product should be equipped with an emergency eyewash and shower, both equipped with clean water, in the immediate work area.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE, APPEARANCE, AND ODOR:	Liquid, clear, light amber color, mild detergent odor.
ODOR THRESHOLD:	Not available.
MOLECULAR WEIGHT:	Not applicable.
SPECIFIC GRAVITY:	1 (water = 1).
DENSITY:	8.3 LB/US gal (1000 g/l)
VAPOR DENSITY:	Less than 1 (air = 1)
VAPOR PRESSURE:	17.5 mm Hg at 68°F (20°C)
BOILING POINT:	212°F (100°C)
FREEZING/MELTING POINT:	32°F (0°C)
pH:	11.5
EVAPORATION RATE:	Less than 1 (butyl acetate = 1)
SOLUBILITY IN WATER:	Complete.
FLASH POINT:	>212°F (100°C).
FLAMMABLE LIMITS IN AIR:	Not applicable.
AUTOIGNITION TEMPERATURE:	Not applicable.

SECTION 10: STABILITY AND REACTIVITY

STABILITY:	Stable under normal temperatures and pressures.
INCOMPATIBILITY:	Avoid acids, oxidizing agents, or reducing agents.

REACTIVITY: Polymerization is not known to occur under normal temperatures and pressures. Not reactive with water.

HAZARDOUS DECOMPOSITION PRODUCTS: None under normal temperatures and pressures. See also **SECTION 5: HAZARDOUS COMBUSTION PRODUCTS**.

SECTION 11: TOXICOLOGICAL INFORMATION

SENSITIZATION: Based on best current information, there is no known human sensitization associated with this product.

MUTAGENICITY: Based on best current information, there is no known mutagenicity associated with this product.

CARCINOGENICITY: Based on best current information, there is no known carcinogenicity as regulated by OSHA; as categorized by ACGIH A1 or A2 substances; as categorized by IARC Group1, Group 2A, or Group 2B agents; or as listed by NTP as either known carcinogens or substances for which there is limited evidence of carcinogenicity in humans or sufficient evidence of carcinogenicity in experimental animals.

REPRODUCTIVE TOXICITY: Based on best current information, there is no known reproductive toxicity associated with this product.

TERATOGENICITY: Based on best current information, there is no known teratogenicity associated with this product.

TOXICOLOGICALLY SYNERGISTIC PRODUCT(S): Based on best current information, there are no known toxicologically synergistic products associated with this product.

SECTION 12: ECOLOGICAL INFORMATION

ECOTOXICITY: 10 to 100 ppm aquatic LC_{50} (approximately)

OCTANOL/WATER PARTITION COEFFICIENT: Not available.

VOLATILE ORGANIC COMPOUNDS:	0 WT%; 0 LB/US gal; 0 g/l As per 40 CFR Part 51.100(s).

SECTION 13: DISPOSAL CONSIDERATIONS

DISPOSAL: Dispose in accordance with federal, state, provincial, and local regulations. Regulations may also apply to empty containers. The responsibility for proper waste disposal lies with the owner of the waste. Contact Safety-Kleen regarding recycling or proper disposal.

USEPA WASTE CODE(S): This product, if discarded is not expected to be a characteristic or listed hazardous waste. Processing, use, or contamination by the user may change the waste code(s) applicable to the disposal of this product.

SECTION 14: TRANSPORT INFORMATION

DOT: Not regulated.

TDG: Not regulated.

EMERGENCY RESPONSE GUIDE NUMBER: Not applicable.
Reference *North American Emergency Response Guidebook*

SECTION 15: REGULATORY INFORMATION

USA REGULATIONS

SARA SECTIONS 302 AND 304: This product does not contain any "extremely hazardous substances" listed pursuant to Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA) Section 302 or Section 304 as identified in 40 CFR Part 355, Appendix A and B.

SARA SECTIONS 311 AND 312: This product poses the following health hazards as defined in 40 CFR Part 370 and is subject to the requirements of sections 311 and 312 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA):

Immediate (Acute) Health Hazard
Delayed (Chronic) Health Hazard

AquaWorks® MPC Cleaning Solution
MATERIAL SAFETY DATA SHEET FOR USA AND CANADA

SARA SECTION 313: This product does not contain toxic chemicals subject to the requirements of section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

CERCLA: This product does not contain any "hazardous substances" listed pursuant to the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) in 40 CFR Part 302, Table 302.4.

TSCA: All the components of this product are listed on, or are exempted from the requirement to be listed on, the TSCA Inventory.

CALIFORNIA: This product does not contain detectable amounts of any chemical known to the State of California to cause cancer.

This product does not contain detectable amounts of any chemical known to the State of California to cause birth defects or other reproductive harm.

CANADIAN REGULATIONS
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS: Class D2B

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA): All the components of this product are listed on, or are exempted from the requirement to be listed on, the Canadian Domestic Substances List (DSL).

SECTION 16: OTHER INFORMATION

REVISION INFORMATION: New product.

LABEL/OTHER INFORMATION: Not available.

RAW DATA

SECTION 25 – STATIONARY INTERNAL COMBUSTION EQUIPMENT

Add to Air Emission

Great Falls Gas Company

A DIVISION OF ENERGY WEST INCORPORATED
No. 1 First Avenue South • P.O. Box 2229 • Great Falls, Montana 59403-2229
Phone: (406) 791-7500 MT: 1(800) 570-5688 Fax: (406) 791-7560

Attn: Jeff Brekke
Please deliver immediately

REVISED August 13, 1996 from June 30, 1997 original proposal

ENERGY WEST offers CNG equipment and installation for a price of $282,000

A 110 cfm natural gas refueling station; two RIX 4VX compressors (gas fired), TECO 7.4L engine and EDO-ANGI AMP 3 controls mounted on a 12' X 8' skid. Storage tanks with capacity of 30,000 standard cubic feet at 5,000 psig. The dispenser is a EDO ANGI MCDS, 2 hose, with a Fuelmaster management software system. A natural gas dryer, Xebec model STCNG 24 with on-site regeneration is included.

This proposal is based on MAFB only refueling 92 vehicles. If more than 92 vehicles are using this station, additional equipment not included in this proposal may be required.

ENERGY WEST is willing to negotiate with MAFB for a separate maintenance and/or operating agreement, preferably on an hourly rate basis.

Proposal includes purchase, delivery, installation, and final connection of pre-installed electrical, natural gas, communication and dispenser lines of natural gas compressor, storage and dispenser.
Proposal includes startup of system and initialization of dispenser software.
Proposal includes four to eight hours training for operating personnel.
Proposal includes 100% backup fueling at GFGC compressor station 24 hours a day at MAFB retail GEG (gasoline equivalent gallon) price, in the event the MAFB compressor station is disabled.

All equipment and installation changes not included in above detail will be priced and approved separately and is explicitly not included in this proposal. MAFB's changes, made after EWST acceptance of the order, that affect the specifications or configurations of the goods or otherwise affect the scope of the order shall be submitted in writing by EWST and shall become binding only if approved in writing by an officer of EWST. All charges and shipping delays resulting from such changes shall be solely determined by EWST and shall be binding on MAFB.

Concrete pads will be constructed by MAFB under separate contract. Conduit for and underground piping/wiring of natural gas, electricity and dispenser gas lines and dispenser communications lines will be installed by MAFB under separate contract.

A separate agreement for maintenance is available. Maintenance agreements are priced on an hourly basis. Maintenance personnel are located in Great Falls, MT for accessibility to MAFB location.

Two percent discount if 75% of total price ($212,000) is paid within 25 days of delivery of the skid-mounted unit to the site. One percent discount on amount of final invoice if invoices is paid within 25 days of date of invoice.

Sheila Rice, Vice President

The 7.4L engine powers 2 NG compressors ... emissions are produced by the 7.4L engine ... 160 ... hrs ... 1991

WASTE OIL BURNER

Building 870
- OMNI multi-oil Fired Unit heater
- 225,000 btu/hR
- 8" vent ≈ 20' high
- Burned 888 gallons WASTE oil in 1999

- SSGT BAYUS x6083

USE This page only

Stationary IC Engine - Generato

DIESEL-FIRED (Up to 447 kW or 600 hp)

Number of Units	Owner	Serial #	Model #	Manufacturer	Building	Rated Output, kW	Typical Load, kW	1999 Operating Hrs	Fuel Type	Fuel Use Per Hr
1	Base	2WOBO1694	3406DI	CATERPILLAR	144	250	150	27.1	Diesel	18.8
1	Base	85Z01446	3406DI	CATERPILLAR	152	175	100	10.5	Diesel	14.8
1	Base	66D48062	3306PC	CATERPILLAR	160	155	85	25	Diesel	11.5
1	Base	1111754	5.0EGHEB	ONAN	200	5	3	65	Gasoline	0.5
1	Base	82533M	TP-5A4-DC	OVER-LOWE	200	6	4	17	Diesel	1
1	Base	F880130499	15-RDJC	ONAN	200	15	10	13.1	Diesel	1.3
1	Base	H900340891	15-RDJC	ONAN	200	15	10	29.4	Diesel	1.3
1	Base	341188	S20D18	US MOTORS	200	20	10	15.3	Diesel	2.4
1	Base	KZ04269	MEP-005A	HOLLINGSWORTH	200	30	25	26.1	Diesel	3.1
1	Base	FZ03234	MEP-006A	FERMONT	200	60	45	14.5	Diesel	4.6
1	Base	BW00119	MEP-007B	FOSTER ENT.	200	100	75	15	Diesel	7.5
1	Base	BW00183	MEP-007B	FOSTER ENT.	200	100	75	14.5	Diesel	7.5
1	Base	BW00187	MEP-007B	FOSTER ENT.	200	100	75	16.8	Diesel	7.5
1	Base	KZ00091	MEP-009B	HOLLINGSWORTH	200	200	175	17.8	Diesel	14.8
1	Base	KZ00099	MEP-009B	HOLLINGSWORTH	200	200	175	14.2	Diesel	14.8
1	Base	E920470279	100DGDB	ONAN	249	100	35	2.4	Diesel	7.5
1	Base	763412	SD020	GENERAC	294	15	8	38.9	Diesel	2.4
1	Base	D980729992	100DGDB	ONAN	348	100	75	24.7	Diesel	7.5
1	Base	B60573	DMT-60C3	DMT	407	60	25	25.9	Diesel	4.6
1	Base	E910391396	30DGAD	ONAN	429	30	12	16.5	Diesel	2.4
1	Base	F880130500	15-RDJC	ONAN	496	15	10	22	Diesel	1.3
1	Base	L870951713	20.0DL4	ONAN	530	20	15	16.1	Diesel	2.4
1	Base	F820624909	30.0ODDA-15R	ONAN	771	30	20	21.7	Diesel	3.1
1	Base	H900340892	15.ORDJC	ONAN	910	15	5	29.4	Diesel	1.3
1	Base	J882139997	NTA-855-G52	CUMMINS	1075	300	225	4	Diesel	21
1	Base	220030	6CT8.3GC	CUMMINS	1082	125	65	13.6	Diesel	8.9
1	Base	860984	88A01093-6	GENERAC	1320	20	9	12.7	Diesel	2.4
1	Base	234660	4BT3.9G2	CUMMINS	1408	60	35	20.6	Diesel	4.6
1	Base	D3781A/001	D100P1/001	OLYMPIAN	1439	100	65	24.5	Diesel	6
1	Base	A920445325	100DGDB	ONAN	1440	100	85	19.3	Diesel	7.5
1	Base	811147	175DGFB	ONAN	1839	175	100	43.7	Diesel	14
1	Base	F8206249	30.0DDA	ONAN	1879	30	15	27.9	Diesel	3.1
1	Base	G93051468	35EGBB	ONAN	1881	35	16	245.7	Diesel	3.5
1	Base	K9600622834	100DGDB	ONAN	1848	100	55	29.4	Diesel	7.5
1	Base	30305858	NT855652	CUMMINS	1884	200	75	1	Diesel	14.8
1	Base	1950585433	100DGDB	ONAN	1996	100	60	12.7	Diesel	7.5
1	Base	A960597151	125-DGEA	ONAN	3080	125	85	24.2	Diesel	8
1	Base	85B781	D330	CATERPILLAR	P00	75	45	26.3	Diesel	6
1	Base	85B895	D330	CATERPILLAR	Q00	75	45	17.3	Diesel	6
1	Base	85B866	D330	CATERPILLAR	R00	75	45	60.9	Diesel	6
1	Base	85B888	D330	CATERPILLAR	S00	75	45	27.9	Diesel	6
1	Base	85B1033	D330	CATERPILLAR	T00	75	45	40.9	Diesel	6
1	Base	11475968	NT-855-F3	CUMMINS	1459	PUMP	2000 GPM	13.1	Diesel	20
1	Base	11479673	NT-855-F3	CUMMINS	1459	PUMP	2000 GPM	13.7	Diesel	20
1	Base	11475970	NT-855-F3	CUMMINS	1459	PUMP	2000 GPM	13.3	Diesel	20

OVER 447 KW OR 600 HP

1	Base	G880140225	VTA28-GS2	CUMMINS	500	500	260	32	Diesel	45
1	Base	A930497772	500DFFB	ONAN	1482	500	295	10.2	Diesel	37
1	Base	99291	VTA-1710-GS2	CUMMINS	1831	510	375	51.2	Diesel	37
1	Base	81208007	3412	CATERPILLAR	2040	500	385	61.9	Diesel	37
1	Base	RU190Y8	VHP5900DSI	WAUKESHA	82110	940	650	26	Diesel	76

RAW DATA

SECTION 26 – SULFURIC ACID BATTERY MAINTENANCE

Maint. Sulfuric Acid Batteries

1. Number of batteries drained in 1999 or item 3 below: 35 est.
2. Schedule of operation for draining batteries : N/A
3. Quantity of sulfuric acid used in 1999: 75 Gal.

RAW DATA

SECTION 27 – SURFACE COATING

Date Run: [illegible]/20/00

AF FORM 2761 - HAZARDOUS MATERIAL USE

Command: AFSPC Orgn: 341 CES Office: CEOFB BES-WPID: 00124-CEXX-104A Shop Code: MM215 Orgn Title: HVAC
Bldg: 471 Shop Location: DLVD 471 Supv Name: TSGT THOMAS BAKER Phone No.: (493) 3 - CSA id: 99

NSN / Cage	Proc Code / Ver	Comp	Amt Min	Noun / Manufacturer's Name / Amt Max	Conc	% By	CAS	Specification / NIOSH	Part Number/Trade Name / Chemical Name	Disposal Method	INH	ABS	Unit Size / MSDS ING	UI Unit / MSDS CON	Pkg Date
6810PTOWERBROM	FA03			TOWERBROM				90M		CONSUMED IN USE			800.00	OZ	DR
OXDNL	1	1		OCCIDENTAL CHEMICAL CORPORATION					TOWERBROM 90M TABLETS				Y	5/26/93	
			92.00	93.00	%	W	0000000002		CAS NUMBER NOT LISTED/FOUND						
			7.00	8.00	%	W	0007647156		SODIUM BROMIDE						
Total Qty Issu			1.00												
6830002442741	FA03			GAS, NITROGEN 225CF				BB-N-411 TYIGRBCL1		CONSUMED IN USE			225.00	CF	
GENER	1	1		GENERAL DISTRIBUTING					GAS, NITROGEN 225CF				Y	8/24/89	
			100.00	100.00	%	W	0007727379	QW9700000	NITROGEN		N	N	N	N	
Total Qty Issu			1.00												
683000N072761	FA03			FREON, 401A				MP-39		INDUSTRIAL WASTE TREATM			30.00	LB	CY
18873	1	1		E I DUPONT DE NEMOURS AND CO INC					SUVA MP39 (R401A)				Y	6/14/95	
			13.00	13.00	%	W	0000075376		DIFLUOROETHANE						
			53.00	.53.00	%	W	0000075456	PA6390000	CHLORODIFLUOROMETHANE [HCFC-22]		Y	N	N	Y	
			34.00	34.00	%	W	0002837890		2-CHLORO-1,1,1,2-TETRAFLUOROETHANE [HCFC-124]						
Total Qty Issu			1.00												
8010007219743	PA01			PAINT, ENAMEL, RED				A-A-665		CONSUMED IN USE			16.00	OZ	CN
0FTT5	D	1		LHB INDUSTRIES					SO-SURE GLOSS RED SPRAY PAINT 11105 (0014-110				Y	5/ 6/96	
			20.21	20.21	%	W	0000067641	AL3150000	ACETONE		Y	N	Y	Y	
			16.72	16.72	%	W	0000074986		PROPANE						
			4.11	4.11	%	W	0000075285	TZ4300000	ISOBUTANE						
			6.58	6.58	%	W	0000106978	EJ4200000	BUTANE		Y	N	N	Y	
			25.22	25.22	%	W	0000108883	XS5250000	TOLUENE		Y	Y	Y	Y	
			0.00	1.58	%	W	0001330207	ZE2100000	XYLENE (MIXED ISOMERS) {SEE ALSO CAS NUM: 954		Y	Y	Y	Y	
			6.31	6.31	%	W	0008030306	QI9450000	NAPHTHA		Y	N	N	N	
			0.00	1.59	%	W	0064742956		SOLVENT NAPHTHA,LIGHT AROMATIC (C8-10)						
Total Qty Issu			1.00												
8030009996313	FA03			SEALING COMPOUND				LEAKLOCK		OTHER			1.50	OZ	TU
08589	C	1		HIGHSIDE CHEMICALS INC					LEAK LOCK (R)				Y	12/16/91	
			31.00	100.00	%	W	0000064175	KQ6300000	ETHANOL		Y	N	Y	Y	
			0.00	2.00	%	W	0000067630	NT8050000	ISOPROPYL ALCOHOL (MANUFACTURED BY STRONG		Y	N	Y	Y	

AF FORM 2761 - HAZARDOUS MATERIAL USE

Command: AFSPC | Orgn: 341 TRNS | Office: LGTMGP | BES-WPID: 00124-TRVM-055A | Shop Code: 424GP | Orgn Title: GENERAL PURPOSE
Bldg: 870 | Shop Location: RM N/A DVLD 870 | Supv Name: TSGT DARREL R. STEGMAN | Phone No.: (631) 6 - | CSA id: 99

NSN / Cage	Ver	Proc Code / Comp / Amt Min	Noun / Manufacturer's Name / Amt Max	Conc	% By	CAS	Specification / NIOSH	Part Number/Trade Name / Chemical Name	Disposal Method	INH	ABS	Unit Size / MSDS ING	UI Unit / MSDS CON	Pkg / Date
6850P80079		AD07	CARB AND CHOKE CLEANER				80079		CONSUMED IN USE			12.00	OZ	CN
77247	1	1	PERMATEX CO INC					CARB AND CHOKE CLEANER				Y	4/ 4/96	
		1.00	5.00	%	V	0000067561	PC1400000	METHANOL		Y	N	Y	Y	
		1.00	5.00	%	V	0000067630	NT8050000	ISOPROPYL ALCOHOL (MANUFACTURED BY STRONG		Y	N	Y	Y	
		20.00	25.00	%	V	0000067641	AL3150000	ACETONE		Y	N	Y	Y	
		20.00	25.00	%	V	0000074986		PROPANE						
		55.00	60.00	%	V	0001330207	ZE2100000	XYLENE (MIXED ISOMERS) {SEE ALSO CAS NUM: 9547		Y	Y	Y	Y	
Total Qty Issu		28.00												
6850PFW-16		AD07	ADDITIVE, COOLING SYSTEM						CONSUMED IN USE			16.00	OZ	BT
23040	1	1	FORD MOTOR COFORD PARTS AND SERVICE DIV					MOTORCRAFT FW-16				Y	2/26/98	
		10.00	30.00	%	W	0001310583	TT2100000	POTASSIUM HYDROXIDE						
		5.00	10.00	%	W	0007664382	TB6300000	PHOSPHORIC ACID		Y	N	Y	Y	
Total Qty Issu		24.00												
793000F037389		AD07	FLUID, BRAKE WASHER, T-N-T				300-361/300-305		CONSUMED IN USE			640.00	OZ	CN
0C1P4	1	1	CLAYTON ASSOCIATES INC					300-361/300-305 T-N-T SUPER CONCENTRATED CLE				Y	9/ 1/93	
		0.00	3.00	%	W	0000112345	KJ9100000	DIETHYLENE GLYCOL MONO-N-BUTYL ETHER		N	N	Y	Y	
		0.00	3.00	%	W	0052232094		ALKOXYLATED LINEAR ALCOHO						
Total Qty Issu		3.00												
7930P59035		AD07	CLEANER, FLUSH SOLVENT						INDUSTRIAL WASTE TREATM			32.00	OZ	
0ATV9	1	1	MICRO CARE CHEMICAL CORP					FLUSH SOLVENT 141B; 59035				Y	11/ 7/95	
		100.00	100.00	%	W	0001717006		1,1-DICHLORO-1-FLUOROETHANE [HCFC-141B]						
Total Qty Issu		7.00												
801000F007671		PA09	PAINT, AEROSOL				T-1		CONSUMED IN USE			16.00	OZ	CN
07708	1	1	PLASTI-KOTE CO;					TARGET SUPER ENAMEL T-1 GLOSS BLACK, X8260				Y	3/ 1/85	
		5.00	10.00	%	W	0000064175	KQ6300000	ETHANOL		Y	N	Y	Y	
		30.00	40.00	%	W	0000067641	AL3150000	ACETONE		Y	N	Y	Y	
		0.00	23.00	%	W	0000074986		PROPANE						
		0.00	23.00	%	W	0000075285	TZ4300000	ISOBUTANE						
		0.00	5.00	%	W	0000078933	EL6475000	METHYL ETHYL KETONE		Y	N	Y	Y	
		5.00	6.00	%	W	0000123422	SA9100000	4-HYDROXY-4-METHYL-2-PENTANONE		Y	N	Y	Y	

Date Run: 6/20/00

AF FORM 2761 - HAZARDOUS MATERIAL USE

Command: AFSPC | Orgn: 341 TRNS | Office: LGTMGP | BES-WPID: 00124-TRVM-055A | Shop Code: 424GP | Orgn Title: GENERAL PURPOSE
Bldg: 870 | Shop Location: RM N/A DVLD 870 | Supv Name: TSGT DARREL R. STEGMAN | Phone No.: (631) 6 - | CSA id: 99

NSN / Cage	Proc Code	Ver	Comp / Amt Min	Noun / Manufacturer's Name / Amt Max	Conc	% By	CAS	Specification / NIOSH	Part Number/Trade Name / Chemical Name	Disposal Method	INH	ABS	Unit Size / MSDS ING	UI Unit / MSDS CON	Pkg Date
			5.00	10.00	%	W	0001330207	ZE2100000	XYLENE (MIXED ISOMERS) {SEE ALSO CAS NUM: 9547		Y	Y	Y	Y	
Total Qty Issu 12.00															
8010013331441-1	PA09			PAINT, ENAMEL, OLIVE DRAB						CONSUMED IN USE			16.00	OZ	PT
							0.89	90							
0FTT5		C	1	LHB INDUSTRIES					ECO SURE GREEN #14084 (0674-144)				Y	5/28/95	
			0.00	2.92	%	W	0000071363	EO1400000	N-BUTYL ALCOHOL		Y	Y	Y	Y	
			14.46	14.46	%	W	0000074986		PROPANE						
			0.00	2.92	%	W	0000095636	DC3325000	1,2,4-TRIMETHYLBENZENE						
			0.00	2.92	%	W	0000107879	SA7875000	METHYL N-PROPYL KETONE		Y	N	Y	Y	
			0.00	2.92	%	W	0000108101	SA9275000	METHYL ISOBUTYL KETONE		Y	N	Y	N	
			5.84	5.84	%	W	0000110123	MP3850000	5-METHYL-2-HEXANONE		Y		Y	N	
			8.03	8.03	%	W	0000115106		METHYL ETHER						
			0.00	22.07	%	W	0001330207	ZE2100000	XYLENE (MIXED ISOMERS) {SEE ALSO CAS NUM: 9547		Y	Y	Y	Y	
			5.84	5.84	%	W	0064742956		SOLVENT NAPHTHA,LIGHT AROMATIC (C8-10)						
Total Qty Issu 12.00															
8010P08643	PA09			PAINT, WINDOW, BLACK				08643		CONSUMED IN USE			16.00	OZ	CN
76381		1	1	3M; CORPORATE OFFICES					PAINT, WINDOW, BLACK				Y	9/30/96	
			10.00	10.00	%	V	0001333864	FF5800000	C.I. PIGMENT BLACK 7		Y	N	N	Y	
			20.00	20.00	%	V	0008052106		TALL-OIL ROSIN						
Total Qty Issu 3.00															
8010P1601	PA09			PAINT, AEROSOL, BLACK				1601		CONSUMED IN USE			12.00	OZ	
54636		1	1	SHERWIN-WILLIAMS CO					1601 GLOSSY BLACK KRYLON INT/EXT ENAMEL				Y	4/10/89	
			30.00	50.00	%	W	0000067641	AL3150000	ACETONE		Y	N	Y	Y	
			1.00	5.00	%	W	0000071363	EO1400000	N-BUTYL ALCOHOL		Y	Y	Y	Y	
			10.00	30.00	%	W	0000074986		PROPANE						
			5.00	10.00	%	W	0000078933	EL6475000	METHYL ETHYL KETONE		Y	N	Y	Y	
			1.00	5.00	%	W	0000108101	SA9275000	METHYL ISOBUTYL KETONE		Y	N	Y	N	
			5.00	10.00	%	W	0000108656	AI8925000	1-METHOXY-2-PROPANOL ACETATE						
			1.00	5.00	%	W	0000108883	XS5250000	TOLUENE		Y	Y	Y	Y	
			10.00	30.00	%	W	0001330207	ZE2100000	XYLENE (MIXED ISOMERS) {SEE ALSO CAS NUM: 9547		Y	Y	Y	Y	
Total Qty Issu 4.00															

Dat Run: 6/20/00 **AF FORM 2761 HAZARDOUS MATERIAL USE** Page: 300

Command: AFSPC	Orgn: 341 TRNS	Office: LGTMGP	BES-WPID: 00124-TRVM-055A	Shop Code: 424GP	Orgn Title: GENERAL PURPOSE	
Bldg: 870	Shop Location: RM N/A DVLD 870		Supv Name: TSGT DARREL R. STEGMAN		Phone No.: (631) 6 -	CSA id: 99

NSN / Cage	Proc Code / Ver	Comp / Amt Min	Noun / Manufacturer's Name / Amt Max	Conc	% By	CAS	Specification / NIOSH	Part Number/Trade Name / Chemical Name	Disposal Method	INH	ABS	Unit Size / MSDS ING	UI Unit / MSDS CON	Pkg Date
8010P20033	AD07		PAINT,AEROSOL (FLAT BLK ENAMEL)						CONSUMED IN USE			12.00	OZ	CN
0WT79	1	1	PENRAY COMPANIES			0.79	-100-	PAINT,20033				Y	3/ 5/96	
		25.00	30.00	M		0000067641	AL3150000	ACETONE		Y	N	Y	Y	
		10.00	20.00	M		0000108883	XS5250000	TOLUENE		Y	Y	Y	Y	
		1.00	5.00	M		0001330207	ZE2100000	XYLENE (MIXED ISOMERS) (SEE ALSO CAS NUM: 9547		Y	Y	Y	Y	
		1.00	5.00	M		0008052413	WJ8925000	STODDARD SOLVENT		Y	N	Y	Y	
		20.00	25.00	M		0068476868		LIQUIFIED PETROLEUM GAS						
Total Qty Issu 124.00														
8010P2101	PA09		PAINT, AEROSOL				2101		CONSUMED IN USE			12.00	OZ	CN
KRYLO	1	1	KRYLON INDUSTRIAL					2101, CHERRY RED INDUSTRIAL MAINTENANCE &				Y	3/ 1/95	
		34.00	34.00	%	W	0000067641	AL3150000	ACETONE		Y	N	Y	Y	
		13.00	13.00	%	W	0000074986		PROPANE						
		8.00	8.00	%	W	0000078933	EL6475000	METHYL ETHYL KETONE		Y	N	Y	Y	
		2.00	2.00	%	W	0000100414	DA0700000	ETHYLBENZENE		Y	N	Y	Y	
		7.00	7.00	%	W	0000106978	EJ4200000	BUTANE		Y	N	N	Y	
		3.00	3.00	%	W	0000108101	SA9275000	METHYL ISOBUTYL KETONE		Y	N	Y	N	
		7.00	7.00	%	W	0000108656	AI8925000	1-METHOXY-2-PROPANOL ACETATE						
		10.00	10.00	%	W	0001330207	ZE2100000	XYLENE (MIXED ISOMERS) (SEE ALSO CAS NUM: 9547		Y	Y	Y	Y	
Total Qty Issu 1.00														
8010PT-41	AD07		PAINT, ENAMEL				T-41		CONSUMED IN USE			12.00	OZ	CN
07708	1	1	PLASTI-KOTE CO;					T-41, TARGET DULL ALUMINUM				Y	10/15/8	
		0.00	81.00	%	W	0000000002		CAS NUMBER NOT LISTED/FOUND						
		0.00	5.00	%	W	0000064175	KQ6300000	ETHANOL		Y	N	Y	Y	
		40.00	45.00	%	W	0000067641	AL3150000	ACETONE		Y	N	Y	Y	
		0.00	5.00	%	W	0000078933	EL6475000	METHYL ETHYL KETONE		Y	N	Y	Y	
		0.00	5.00	%	W	0000107982	UB7700000	1-METHOXY-2-PROPANOL						
		10.00	15.00	%	W	0000108101	SA9275000	METHYL ISOBUTYL KETONE		Y	N	Y	N	
		5.00	10.00	%	W	0000108883	XS5250000	TOLUENE		Y	Y	Y	Y	
		0.00	5.00	%	W	0000123422	SA9100000	4-HYDROXY-4-METHYL-2-PENTANONE		Y	N	Y	Y	
Total Qty Issu 8.00														

Date Run: 6/20/00

AF FORM 2761 - HAZARDOUS MATERIAL USE

Bldg. 870

Command: AFSPC Orgn: 341 MXS Office: LGMSC BES-WPID: Shop Code: MM009 Orgn Title: CORROSION CONTROL
Bldg: 3065/3 Shop Location: RM N/A DLVD (E39) Supv Name: WILLARD SCHMITT Phone No.: (427) 9 - CSA id: 02

NSN / Cage	Proc Code / Ver	Comp	Noun / Amt Min	Manufacturer's Name / Amt Max	Conc	% By	CAS	Specification / NIOSH	Part Number/Trade Name / Chemical Name	Disposal Method	INH	ABS	Unit Size / MSDS ING	UI Unit / MSDS CON	Pkg / Date
6810002056786	FA01		ALCOHOL, DENATURED					O-E-760 TY4		OTHER			32.00	OZ	CN
0A9L8	C	1		HOME OIL COMPANY INC					O-E-760D TYPE IV, ALCOHOL, DENATURED				Y	5/ 6/96	
			91.49	91.49	%	W	0000064175	KQ6300000	ETHANOL		Y	N	Y	Y	
			4.61	4.61	%	W	0000067561	PC1400000	METHANOL		Y	N	Y	Y	
			2.91	2.91	%	W	0000108883	XS5250000	TOLUENE		Y	Y	Y	Y	
Total Qty Issu 2.00															
8010001818080	FA01		THINNER, PAINT PRODUCTS					MIL-T-81772		OTHER			128.00	OZ	CN
4N760	1	1		C S D INC					THINNER, PAINT, POLYURETHANE				Y	7/ 1/88	
			30.50	30.50	%	V	0000078933	EL6475000	METHYL ETHYL KETONE		Y	N	Y	Y	
			10.50	10.50	%	W	0000108883	XS5250000	TOLUENE		Y	Y	Y	Y	
			11.00	11.00	%	V	0000123864	AF7350000	BUTYL ACETATE		Y	N	Y	Y	
			7.00	7.00	%	V	0001330207	ZE2100000	XYLENE (MIXED ISOMERS) (SEE ALSO CAS NUM: 9547		Y	Y	Y	Y	
			41.00	41.00	%	V	0088230357		HEXYL ACETATE MIXED ISOME						
Total Qty Issu 2.00															
8010002970585	FA01		PAINT, ENAMEL							INDUSTRIAL WASTE TREATM			1.00	GL	CN
6F266	1	1		FARWEST PAINT MFG CO					YELLOW 23538,ALKYD,SEMI				Y	9/ 1/91	
			0.00	27.00	%	W	0008032324	SE7555000	LIGROIN		Y	N	Y	Y	
Total Qty Issu 3.00															
8010002982287	FA01		PAINT, ENAMEL, BLUE 15045					TT-E-498 TY1CLA		INDUSTRIAL WASTE TREATM			128.00	OZ	
61196	1	1		PRATT AND LAMBERT INC					ENAMEL, ALKYD, GLOSS, LO VOC CNT, BLUE 1504				Y	1/26/94	
			5.00	5.00	%	W	0000078933	EL6475000	METHYL ETHYL KETONE		Y	N	Y	Y	
			0.00	5.00	%	W	0000100414	DA0700000	ETHYLBENZENE		Y	N	Y	Y	
			5.00	5.00	%	W	0000110123	MP3850000	5-METHYL-2-HEXANONE		Y		Y	N	
			10.00	10.00	%	W	0000123864	AF7350000	BUTYL ACETATE		Y	N	Y	Y	
			0.00	5.00	%	W	0000147148		C.I. PIGMENT BLUE 15						
			0.00	1.00	%	W	0001317959		SILICA, CRYSTALLINE TRIPOLI						
			10.00	10.00	%	W	0001330207	ZE2100000	XYLENE (MIXED ISOMERS) (SEE ALSO CAS NUM: 9547		Y	Y	Y	Y	
			0.00	5.00	%	W	0008052413	WJ8925000	STODDARD SOLVENT		Y	N	Y	Y	
			5.00	5.00	%	W	0013463677	XR2275000	TITANIUM DIOXIDE		Y	N	N	N	
			0.00	1.00	%	W	0014808607	VV7330000	QUARTZ (SIO2)		Y			Y	

Command: AFSPC Orgn: 341 MXS Office: LGMSC BES-WPID: Shop Code: MM009 Orgn Title: CORROSION CONTROL
Bldg: 3065/3 Shop Location: RM N/A DLVD (E39) Supv Name: WILLARD SCHMITT Phone No.: (427) 9 - CSA id: 02

NSN / Cage	Proc Code / Ver	Comp / Amt Min	Noun / Manufacturer's Name / Amt Max	Conc	% By	CAS	Specification / NIOSH	Part Number/Trade Name / Chemical Name	Disposal Method	INH	ABS	Unit Size / MSDS ING	UI Unit / MSDS CON	Pkg / MSDS Date
		0.00	5.00	%	W	0064475850		PETROLEUM SPIRITS						
Total Qty Issu 3.00														
8010002982298		FA01	PAINT, ENAMEL, GRAY 16376, GLOSS						INDUSTRIAL WASTE TREATM			128.00	OZ	CN
61196	1	1	PRATT AND LAMBERT INC					ENAMEL, ALKYD, GLOSS, LO VOC CT GRAY 16376,				Y	1/24/94	
		5.00	5.00	%	V	0000095636	DC3325000	1,2,4-TRIMETHYLBENZENE						
		0.00	5.00	%	V	0000100414	DA0700000	ETHYLBENZENE		Y	N	Y	Y	
		5.00	5.00	%	V	0000123864	AF7350000	BUTYL ACETATE		Y	N	Y	Y	
		10.00	10.00	%	V	0001330207	ZE2100000	XYLENE (MIXED ISOMERS) (SEE ALSO CAS NUM: 9547		Y	Y	Y	Y	
		0.00	5.00	%	W	0008052413	WJ8925000	STODDARD SOLVENT		Y	N	Y	Y	
		10.00	10.00	%	V	0013463677	XR2275000	TITANIUM DIOXIDE		Y	N	N	N	
		5.00	5.00	%	V	0025551137	DC3220000	TRIMETHYLBENZENES						
		0.00	5.00	%	V	0064742956		SOLVENT NAPHTHA,LIGHT AROMATIC (C8-10)						
Total Qty Issu 12.00														
54636	1	1	SHERWIN-WILLIAMS CO					B54WZ101, GRAY #16376				Y	5/29/98	
		0.00	2.00	%	W	0000107211	KW2975000	ETHYLENE GLYCOL		Y	N	Y	Y	
		2.00	2.00	%	W	0001330207	ZE2100000	XYLENE (MIXED ISOMERS) (SEE ALSO CAS NUM: 9547		Y	Y	Y	Y	
		0.00	2.00	%	W	0001333864	FF5800000	C.I. PIGMENT BLACK 7		Y	N	N	Y	
		11.00	11.00	%	W	0013463677	XR2275000	TITANIUM DIOXIDE		Y	N	N	N	
		14.00	21.00	%	W	0064742887		SOLVENT NAPHTHA PETROLEUM (MEDIUM ALIPH.)						
Total Qty Issu 6.00														
8010002982304		AD06	PAINT, ENAMEL						CONSUMED IN USE			1.00	GL	
61196	1	1	PRATT AND LAMBERT INC					ENAMEL, ALKYD, GLOSS, LOW VOC BROWN 10076				Y	1/25/94	
		5.00	5.00	%	W	0000078933	EL6475000	METHYL ETHYL KETONE		Y	N	Y	Y	
		5.00	5.00	%	W	0000110123	MP3850000	5-METHYL-2-HEXANONE		Y		Y	N	
		10.00	10.00	%	W	0000123864	AF7350000	BUTYL ACETATE		Y	N	Y	Y	
		10.00	10.00	%	W	0001330207	ZE2100000	XYLENE (MIXED ISOMERS) (SEE ALSO CAS NUM: 9547		Y	Y	Y	Y	
		0.00	5.00	%	W	0008032324	SE7555000	LIGROIN		Y	N	Y	Y	
		0.00	1.00	%	W	0014808607	VV7330000	QUARTZ (SIO2)		Y			Y	
		0.00	5.00	%	W	0064475850		PETROLEUM SPIRITS						
		0.00	5.00	%	W	0064742956		SOLVENT NAPHTHA,LIGHT AROMATIC (C8-10)						
Total Qty Issu 5.00														

Date Run: 6/20/00

AF FORM 2761 - HAZARDOUS MATERIAL USE

Command: AFSPC Orgn: 341 MXS Office: LGMSC BES-WPID: Shop Code: MM009 Orgn Title: CORROSION CONTROL
Bldg: 3065/3 Shop Location: RM N/A DLVD (E39) Supv Name: WILLARD SCHMITT Phone No.: (427) 9 - CSA id: 02

NSN	Cage	Proc Code Ver	Noun Comp Amt Min	Manufacturer's Name Amt Max	Conc	% By	CAS	Specification NIOSH	Part Number/Trade Name Chemical Name	Disposal Method	INH	ABS	Unit Size MSDS ING	UI Unit MSDS CON	Pkg Date
8010005305565		AD06	ENAMEL, GREY SEMI-GLO							CONSUMED IN USE			128.00	OZ	CN
	1DY82	1	1	COLUMBIA PAINT CO					TT-E-529G GRAY #26521				Y	8/ 5/97	
			0.10	0.13	%	W	0000110805	KK8050000	2-ETHOXYETHANOL		Y	Y	Y	Y	
			1.00	4.85	%	W	0001318941		SILICEOUS MUSCOVITE MICA						
			1.00	1.17	%	W	0001330207	ZE2100000	XYLENE (MIXED ISOMERS) (SEE ALSO CAS NUM: 9547		Y	Y	Y	Y	
			0.00	3.24	%	W	0001333864	FF5800000	C.I. PIGMENT BLACK 7		Y	N	N	Y	
			1.00	77.06	%	W	0008052413	WJ8925000	STODDARD SOLVENT		Y	N	Y	Y	
			0.00	28.82	%	W	0013463677	XR2275000	TITANIUM DIOXIDE		Y	N	N	N	
			1.00	26.42	%	W	0014807966	VV7720000	TALC		Y	N	N	Y	
			1.00	31.26	%	W	0064742887		SOLVENT NAPHTHA PETROLEUM (MEDIUM ALIPH.)						
			1.00	4.01	%	W	0064742956		SOLVENT NAPHTHA,LIGHT AROMATIC (C8-10)						
	Total Qty Issu	41.00													
	54636	1	1	SHERWIN-WILLIAMS CO					COLOR CHIP 26521				Y	6/ 9/00	
			2.00	2.00	%	W	0001330207	ZE2100000	XYLENE (MIXED ISOMERS) (SEE ALSO CAS NUM: 9547		Y	Y	Y	Y	
			0.00	2.00	%	W	0001333864	FF5800000	C.I. PIGMENT BLACK 7		Y	N	N	Y	
			11.00	11.00	%	W	0013463677	XR2275000	TITANIUM DIOXIDE		Y	N	N	N	
			21.00	21.00	%	W	0064742867		MINERAL SPIRITS						
			14.00	14.00	%	W	0064742887		SOLVENT NAPHTHA PETROLEUM (MEDIUM ALIPH.)						
	Total Qty Issu	24.00													
8010005305567		AD06	PAINT, ENAMEL, GREEN 24518					TT-E-529		CONSUMED IN USE			128.00	OZ	CN
	6F266	1	1	FARWEST PAINT MFG CO					PAINT, ENAMEL, GREY				Y	1/ 6/94	
			5.00	5.00	%	W	0000078933	EL6475000	METHYL ETHYL KETONE		Y	N	Y	Y	
			15.00	15.00	%	W	0000110123	MP3850000	5-METHYL-2-HEXANONE		Y		Y	N	
			5.00	5.00	%	W	0000123864	AF7350000	BUTYL ACETATE		Y	N	Y	Y	
			0.00	5.00	%	W	0001317959		SILICA, CRYSTALLINE TRIPOLI						
			0.00	5.00	%	W	0001330207	ZE2100000	XYLENE (MIXED ISOMERS) (SEE ALSO CAS NUM: 9547		Y	Y	Y	Y	
			15.00	15.00	%	W	0013463677	XR2275000	TITANIUM DIOXIDE		Y	N	N	N	
			20.00	20.00	%	W	0014807966	VV7720000	TALC		Y	N	N	Y	
			5.00	5.00	%	W	0014808607	VV7330000	QUARTZ (SIO2)		Y			Y	
			0.00	5.00	%	W	0064742956		SOLVENT NAPHTHA,LIGHT AROMATIC (C8-10)						
	Total Qty Issu	9.00													
8010005825382		FA01	PAINT, ENAMEL, FLAT BLACK					A-A-665		OTHER			16.00	OZ	CN
	0FTT5	F	1	LHB INDUSTRIES					SO-SURE BLACK 37038 (0014-390)				Y	7/10/97	
			24.15	24.15	%	W	0000067641	AL3150000	ACETONE		Y	N	Y	Y	

Command: AFSPC Orgn: 341 MXS Office: LGMSC BES-WPID: Shop Code: MM009 Orgn Title: CORROSION CONTROL
Bldg: 3065/3 Shop Location: RM N/A DLVD (E39) Supv Name: WILLARD SCHMITT Phone No.: (427) 9 - CSA id: 02

NSN / Cage	Proc Code / Ver	Comp / Amt Min	Noun / Manufacturer's Name / Amt Max	Conc	% By	CAS	Specification / NIOSH	Part Number/Trade Name / Chemical Name	Disposal Method / INH	ABS	Unit Size / MSDS ING	UI Unit / MSDS CON	Pkg / Date
		0.00	1.25	%	W	0000071363	EO1400000	N-BUTYL ALCOHOL	Y	Y	Y	Y	
		16.72	16.72	%	W	0000074986		PROPANE					
		4.11	4.11	%	W	0000075285	TZ4300000	ISOBUTANE					
		3.75	3.75	%	W	0000078933	EL6475000	METHYL ETHYL KETONE	Y	N	Y	Y	
		6.58	6.58	%	W	0000106978	EJ4200000	BUTANE	Y	N	N	Y	
		4.99	4.99	%	W	0000108656	AI8925000	1-METHOXY-2-PROPANOL ACETATE					
		28.46	28.46	%	W	0000108883	XS5250000	TOLUENE	Y	Y	Y	Y	
		1.25	1.25	%	W	0000112072		2-BUTOXYETHANOL ACETATE					
		0.00	1.25	%	W	0001330207	ZE2100000	XYLENE (MIXED ISOMERS) {SEE ALSO CAS NUM: 954	Y	Y	Y	Y	
Total Qty Issu		2.00											
8010006410427	FA01		COMPOUND, NONSLIP, BLACK				MIL-W-5044		OTHER		128.00	OZ	CN
70228	1	1	AKRON PAINT AND VARNISH CO					COMPOUND, NONSLIP, BLACK			Y	5/13/91	
		20.00	50.00	%	V	0014808607	VV7330000	QUARTZ (SIO2)	Y			Y	
		20.00	50.00	%	V	0064742898		PETROLEUM SOLVENT					
Total Qty Issu		7.00											
8010006644761	AD06		PAINT, ENAMEL						CONSUMED IN USE		128.00	OZ	CN
1DV68	1	1	COLUMBIA PAINT CO					COLUMBIA ENAMEL PAINT			Y	11/1/91	
		1.07	6.06	%	W	0000107211	KW2975000	ETHYLENE GLYCOL	Y	N	Y	Y	
		6.00	22.55	%	W	0013463677	XR2275000	TITANIUM DIOXIDE	Y	N	N	N	
		1.00	9.50	%	W	0014807966	VV7720000	TALC	Y	N	N	Y	
		1.00	3.33	%	W	0025265774		2-METHYLPROPANOIC ACID, MONESTER W/2,2,4-TRIM					
Total Qty Issu		10.00											
02388	1	1	NILES CHEMICAL PAINT CO					N-5140 HI GLOSS WHITE WHITE ENAMEL			Y	4/15/98	
		34.00	34.00	%	V	0000000001		NON HAZARDOUS INGREDIENTS					
		22.00	22.00	%	W	0000123864	AF7350000	BUTYL ACETATE	Y	N	Y	Y	
		4.00	4.00	%	W	0001330207	ZE2100000	XYLENE (MIXED ISOMERS) {SEE ALSO CAS NUM: 954	Y	Y	Y	Y	
		1.00	1.00	%	W	0007440484	GF8750000	COBALT	Y	N	Y	Y	
		7.00	7.00	%	W	0007727437		BARIUM SULFATE					
Total Qty Issu		1.00											
54636	1	1	SHERWIN-WILLIAMS CO					PURE WHITE, B54WZ101			Y	5/29/98	
		2.00	2.00	%	W	0001330207	ZE2100000	XYLENE (MIXED ISOMERS) {SEE ALSO CAS NUM: 954	Y	Y	Y	Y	
		0.00	2.00	%	W	0001333864	FF5800000	C.I. PIGMENT BLACK 7	Y	N	N	Y	
		11.00	11.00	%	W	0013463677	XR2275000	TITANIUM DIOXIDE	Y	N	N	N	

AF FORM 2761 - HAZARDOUS MATERIAL USE

Command: AFSPC Orgn: 341 MXS Office: LGMSC BES-WPID: Shop Code: MM009 Orgn Title: CORROSION CONTROL
Bldg: 3065/3 Shop Location: RM N/A DLVD (E39) Supv Name: WILLARD SCHMITT Phone No.: (427) 9 - CSA id: 02

NSN / Cage	Proc Code / Ver	Comp	Amt Min	Noun / Manufacturer's Name / Amt Max	Conc	% By	CAS	Specification / NIOSH	Part Number/Trade Name / Chemical Name	Disposal Method	INH	ABS	Unit Size / MSDS ING	UI / MSDS Date / MSDS CON	Unit Pkg
			14.00	21.00	%	W	0064742887		SOLVENT NAPHTHA PETROLEUM (MEDIUM ALIPH.)						
Total Qty Issu 1.00															
8010009357080	AD06			EPOXY KIT						CONSUMED IN USE			32.00	OZ	CN
87354	1	1		SPRAYLAT CORP					EECY001B MIL-P-23377F				Y	2/23/98	
			50.00	50.00	%	W	0000071363	EO1400000	N-BUTYL ALCOHOL		Y	Y	Y	Y	
			10.00	10.00	%	W	0000100414	DA0700000	ETHYLBENZENE		Y	N	Y	Y	
			25.00	25.00	%	W	0000108101	SA9275000	METHYL ISOBUTYL KETONE		Y	N	Y	N	
			25.00	25.00	%	W	0000108883	XS5250000	TOLUENE		Y	Y	Y	Y	
			10.00	10.00	%	W	0001330207	ZE2100000	XYLENE (MIXED ISOMERS) (SEE ALSO CAS NUM: 9547		Y	Y	Y	Y	
Total Qty Issu 29.00															
8010013363032	FA01			POLYURETHANE COATING				MIL-C-85285B		OTHER			2.00	GL	KT
33461	1	1		DEFT INC; CHEMICAL COATING DIV					MIL-C-85285B, #16473, GRAY PC 03Y091 PART 1 OF				Y	6/13/96	
			0.00	0.10	%	W	0000077587	WH7000000	DIBUTYLTIN DILAURATE		N	N	Y	Y	
			0.03	0.03	%	W	0000100414	DA0700000	ETHYLBENZENE		Y	N	Y	Y	
			5.00	5.00	%	W	0000107879	SA7875000	METHYL N-PROPYL KETONE		Y	N	Y	Y	
			0.00	5.00	%	W	0000123864	AF7350000	BUTYL ACETATE		Y	N	Y	Y	
			10.00	10.00	%	W	0000763699		ETHYL-B-ETHOXYPROPIONATE						
			0.00	1.00	%	W	0001317653	EV9580000	CALCIUM CARBONATE LIMESTONE		Y	N	N	Y	
			0.07	0.07	%	W	0001330207	ZE2100000	XYLENE (MIXED ISOMERS) (SEE ALSO CAS NUM: 9547		Y	Y	Y	Y	
			0.00	1.00	%	W	0064742956		SOLVENT NAPHTHA,LIGHT AROMATIC (C8-10)						
Total Qty Issu 1.00															
33461	1	2		DEFT INC; CHEMICAL COATING DIV					CAT, MIL-C-85285B, 16473, TYPE I (03GY277)				Y	6/13/96	
			45.00	45.00	%	W	0000107879	SA7875000	METHYL N-PROPYL KETONE		Y	N	Y	Y	
			0.00	5.00	%	W	0000123864	AF7350000	BUTYL ACETATE		Y	N	Y	Y	
			5.00	5.00	%	W	0000763699		ETHYL-B-ETHOXYPROPIONATE						
			40.00	40.00	%	W	0028182812		HEXANETHYLENEDIISOCYANATE POLYMER						
			0.00	5.00	%	W	0064742956		SOLVENT NAPHTHA,LIGHT AROMATIC (C8-10)						
Total Qty Issu 1.00															
8010013973942	FA01			POLYURETHANE, BLUE						INDUSTRIAL WASTE TREATM			128.00	OZ	CN
33461	1	1		DEFT INC; CHEMICAL COATING DIV					PAINT, POLYURETHANE, BLUE				Y	11/15/95	
			0.01	0.01	%	W	0000077587	WH7000000	DIBUTYLTIN DILAURATE		N	N	Y	Y	
			0.01	1.00	%	W	0000100414	DA0700000	ETHYLBENZENE		Y	N	Y	Y	
			0.01	1.00	%	W	0000108883	XS5250000	TOLUENE		Y	Y	Y	Y	

Command: AFSPC	Orgn: 341 MXS	Office: LGMSC	BES-WPID:	Shop Code: MM009 Orgn Title: CORROSION CONTROL
Bldg: 3065/3	Shop Location:	RM N/A DLVD (E39)	Supv Name: WILLARD SCHMITT	Phone No.: (427) 9 - CSA id: 02

NSN / Cage	Proc Code Ver	Noun / Comp / Amt Min	Manufacturer's Name / Amt Max	Conc	% By	CAS	Specification / NIOSH	Part Number/Trade Name / Chemical Name	Disposal Method	INH	ABS	Unit Size / MSDS ING	UI Unit / MSDS CON	Pkg Date
		5.00	5.00	%	W	0000110430	MJ5075000	2-HEPTANONE		Y	N	Y	Y	
		0.01	5.00	%	W	0000123546		2,4-PENTANEDIONE						
		10.00	10.00	%	W	0000123864	AF7350000	BUTYL ACETATE		Y	N	Y	Y	
		15.00	15.00	%	W	0000763699		ETHYL-B-ETHOXYPROPIONATE						
		0.01	1.00	%	W	0001317653	EV9580000	CALCIUM CARBONATE LIMESTONE		Y	N	N	Y	
		0.01	1.00	%	W	0001330207	ZE2100000	XYLENE (MIXED ISOMERS) {SEE ALSO CAS NUM: 9547		Y	Y	Y	Y	
		0.01	1.00	%	W	0026376863		FLOW AGENT						
Total Qty Issu		1.00												
33461	1	2	DEFT INC; CHEMICAL COATING DIV					PAINT, POLYURETHANE, BLUE				Y	11/15/9	
				U		0000000002		CAS NUMBER NOT LISTED/FOUND						
Total Qty Issu		1.00												
8010014166556	AD06	EPOXY PRIMER COATING KIT							CONSUMED IN USE			11.55	KT	KT
33461	C	1	DEFT INC; CHEMICAL COATING DIV					EPOXY COMP A, MIL-P-23377G, TYPE 1, CLASS C #C				Y	11/30/99	
		25.00	25.00	%	W	0000107879	SA7875000	METHYL N-PROPYL KETONE		Y	N	Y	Y	
		25.00	25.00	%	W	0007789062		STRONTIUM CHROMATE						
Total Qty Issu		15.00												
33461	C	2	DEFT INC; CHEMICAL COATING DIV					POLYAMIDE COMP B,MIL-P-23377G, #02YO40CAT				Y	11/30/99	
		30.00	30.00	%	W	0000078922	EO1750000	SEC-BUTYL ALCOHOL		Y	N	Y	Y	
		15.00	15.00	%	W	0000140318		1-PIPERAZINEETHANAMINE						
Total Qty Issu		15.00												
8010014415940	FA01	THINNER, PAINT PRODUCTS					A-A-3007		OTHER			128.00	OZ	GL
4N760	1	1	C S D INC					A-A-3007 THINNER, ENAMEL				Y	1/26/96	
		18.00	22.00	%	V	0000067630	NT8050000	ISOPROPYL ALCOHOL (MANUFACTURED BY STRONG		Y	N	Y	Y	
		18.00	22.00	%	V	0000097858		ISOBUTYL ISOBUTYRATE						
		2.30	5.00	%	V	0000141786	AH5425000	ETHYL ACETATE		Y	N	Y	Y	
		54.00	58.00	%	V	0064742898		PETROLEUM SOLVENT						
Total Qty Issu		9.00												
8010P10076	FA01	PAINT, ENAMEL, POLYURETHANE, BASE							OTHER			128.00	OZ	CN
1DV68	1	1	COLUMBIA PAINT CO					RED PRIMER, 10076				Y	11/ 1/91	
		0.10	0.13	%	W	0000110805	KK8050000	2-ETHOXYETHANOL		Y	Y	Y	Y	
		1.00	4.85	%	W	0001318941		SILICEOUS MUSCOVITE MICA						
		1.00	1.17	%	W	0001330207	ZE2100000	XYLENE (MIXED ISOMERS) {SEE ALSO CAS NUM: 9547		Y	Y	Y	Y	
		0.00	3.24	%	W	0001333864	FF5800000	C.I. PIGMENT BLACK 7		Y	N	N	Y	

Date Run: 6/20/00

AF FORM 2761 - HAZARDOUS MATERIAL USE

Command: AFSPC Orgn: 341 MXS Office: LGMSC BES-WPID: Shop Code: MM009 Orgn Title: CORROSION CONTROL
Bldg: 3065/3 Shop Location: RM N/A DLVD (E39) Supv Name: WILLARD SCHMITT Phone No.: (427) 9 - CSA id: 02

NSN / Cage	Proc Code / Ver	Comp / Amt Min	Noun / Manufacturer's Name / Amt Max	Conc	% By	CAS	Specification / NIOSH	Part Number/Trade Name / Chemical Name	Disposal Method	INH	ABS	Unit Size / MSDS ING	UI Unit / MSDS CON	Pkg Date
		1.00	77.06	%	W	0008052413	WJ8925000	STODDARD SOLVENT		Y	N	Y	Y	
		0.00	28.82	%	W	0013463677	XR2275000	TITANIUM DIOXIDE		Y	N	N	N	
		1.00	26.42	%	W	0014807966	VV7720000	TALC		Y	N	N	Y	
		1.00	31.26	%	W	0064742887		SOLVENT NAPHTHA PETROLEUM (MEDIUM ALIPH.)						
		1.00	4.01	%	W	0064742956		SOLVENT NAPHTHA,LIGHT AROMATIC (C8-10)						
Total Qty Issu		4.00												
8010P13711	AD06		PAINT, ENAMEL, POLYURETHANE, BASE				04400WB		CONSUMED IN USE			128.00	OZ	
1DV68	1	1	COLUMBIA PAINT CO					POLYURETHANE ENAMEL, WHIT BASE, 04-400-WB				Y	11/ 1/91	
		5.00	5.00	M		0000110805	KK8050000	2-ETHOXYETHANOL		Y	Y	Y	Y	
		1.00	4.85	%	W	0001318941		SILICEOUS MUSCOVITE MICA						
		100.00	100.00	M		0001330207	ZE2100000	XYLENE (MIXED ISOMERS) (SEE ALSO CAS NUM: 954		Y	Y	Y	Y	
		0.00	3.24	%	W	0001333864	FF5800000	C.I. PIGMENT BLACK 7		Y	N	N	Y	
		100.00	100.00	M		0008052413	WJ8925000	STODDARD SOLVENT		Y	N	Y	Y	
		0.00	28.82	%	W	0013463677	XR2275000	TITANIUM DIOXIDE		Y	N	N	N	
		1.00	26.42	%	W	0014807966	VV7720000	TALC		Y	N	N	Y	
		100.00	100.00	M		0064742887		SOLVENT NAPHTHA PETROLEUM (MEDIUM ALIPH.)						
		80.00	80.00	M		0064742956		SOLVENT NAPHTHA,LIGHT AROMATIC (C8-10)						
Total Qty Issu		3.00												
8030000625866	FA01		CORROSION PREVENTIVE				MIL-C-16173		OTHER			1.00	GL	CN
10777	1	1	VAVOLINE FORMERLY PYROIL COMPANY DIV OF CHA					TECTYL 846				Y	2/13/91	
		45.00	50.00	%		0008052413	WJ8925000	STODDARD SOLVENT		Y	N	Y	Y	
		30.00	60.00	%	W	0064742489		HEAVY NAPTHA						
Total Qty Issu		5.00												
8030005468637	AD06		COMPOUND, CORROSION PREVENTATIVE				MIL-C-81309		CONSUMED IN USE			16.00	OZ	CN
0FTT5	E	1	LHB INDUSTRIES					SO-SURE CORROSION PREVENTATIVE COMPOUNE				Y	9/11/95	
		2.82	2.82	%	W	0000095636	DC3325000	1,2,4-TRIMETHYLBENZENE						
		29.57	29.57	%	W	0000811972		1,1,1,2-TETRAFLUOROETHANE						
		53.52	53.52	%	W	0064742887		SOLVENT NAPHTHA PETROLEUM (MEDIUM ALIPH.)						
Total Qty Issu		11.00												

Date Run: 6/20/00

AF FORM 2761 - HAZARDOUS MATERIAL USE

Command: AFSPC Orgn: 341 MXS Office: LGMSC BES-WPID: Shop Code: MM009 Orgn Title: CORROSION CONTROL
Bldg: 3065/3 Shop Location: RM N/A DLVD (E39) Supv Name: WILLARD SCHMITT Phone No.: (427) 9 - CSA id: 02

NSN / Cage	Proc Code / Ver	Comp / Amt Min	Noun / Manufacturer's Name / Amt Max	Conc	% By	CAS	Specification / NIOSH	Part Number/Trade Name / Chemical Name	Disposal Method	INH	ABS	Unit Size / MSDS ING	UI Unit / MSDS CON	Pkg / Date
8030009381947	FA01		COMPOUND, CORROSION PREVENTIVE				MIL-C-81309		OTHER			1.00	PT	CN
0FTT5	1	1	LHB INDUSTRIES					CORROSION PREVENTIVE COMPOUND				Y	2/14/94	
		1.89	1.89	%	V	0000095636	DC3325000	1,2,4-TRIMETHYLBENZENE						
		24.25	24.25	%	V	0000811972		1,1,1,2-TETRAFLUOROETHANE						
		30.30	30.30	%	V	0025619561		BARIUM DINONYLAPHTHALENES						
		35.99	35.99	%	V	0064742887		SOLVENT NAPHTHA PETROLEUM (MEDIUM ALIPH.)						
Total Qty Issu	1.00													
9150012602534	FA01		LUBRICANT, SOLID FILM				MIL-L-23398		OTHER			16.00	OZ	CN
34227	1	1	SANDSTROM PRODUCTS CO					#238DFL-AEROSOL, MIL-L-23398D				Y	6/ 3/99	
		30.00	35.00	%	W	0000078933	EL6475000	METHYL ETHYL KETONE		Y	N	Y	Y	
						0000108656	AI8925000	1-METHOXY-2-PROPANOL ACETATE						
						0000108941	GW1050000	CYCLOHEXANONE		Y	Y	Y	Y	
						0000115106		METHYL ETHER						
						0000646060		1,3-DIOXOLANE						
		1.00	5.00	%	W	0001309644	CC5650000	ANTIMONY TRIOXIDE		Y	N	Y	Y	
						0001317335	QA4697000	MOLYBDENUM DISULFIDE						
						0025036253		BISPHENOL A EPON 829 POLYMER						
Total Qty Issu	2.00													

RAW DATA

SECTION 29 – WELDING

RED HORSE

Welding

Red Horse

Building Location	Type of Welding Process	Electrode Type	Quantity of electrode used in 1999	Control Equipment	Efficiency
470	SMAW	E6011		None	na
		E7018		None	na
	Oxyacetylene			None	na
	GMAW	ERCuAl-A2		None	na
1447	MIG	Coiled Wire	66#		
	SMAW	E6011	100#		
		E6010	100#		
		E7018	50#		

Both evacuated

Welding ORIGINAL

Building Location	Type of Welding Process	Electrode Type	Quantity of electrode used in 1999	Control Equipment	Efficiency
470	SMAW	E6011	0	None	na
		E7018	0	None	na
	Oxyacetylene		0	None	na
	GMAW	ERCuAl-A2	0	None	na

per Willie Rask

RAW DATA

SECTION 30 – WET COOLING TOWERS

Wet Cooling Towers

Cooling Tower Name/Location	Cooling Tower Type (e.g. induced or natural draft)	Circulating Water Flow Rate through Tower (gal/day)	Number of Days of Operation in 1999	If available, typical Total Dissolved Solids (TSD) Content of water
B500	INDUCED	250 gpm	MAY-DEC.	≈ 900 TDS

CONTACTS: - MR. HANK WYCHEK (CONTACT THROUGH SGT. BAKER @2618)
- DAVE IACOPINI (406) 855-5035

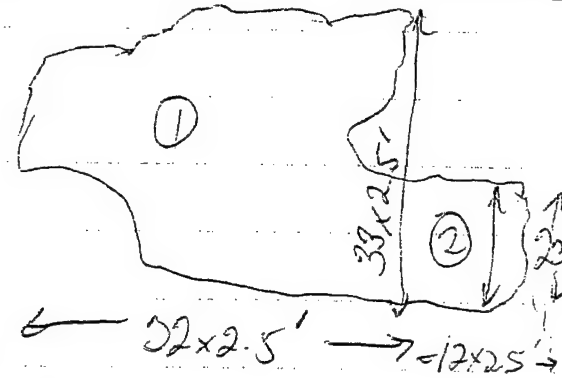
RAW DATA

SECTION 31 – WOOD CHIPPER AND STORAGE

JIM MORRIS B170B

4[illegible]-731-6440

Pile Wood Chip



① ≈ 15'↑ -20'
② ≈ 18-20'

- Assume ② is same size as gaps in ①
$(32 \times 2.5)(33 \times 2.5)(20) = 132{,}000 \text{ ft}^3$
$\approx 5000 \text{ yd}^3$

→ Chips ≈ 3" long by 1" wide

Chip OPERATION

→ Quarterly
→ ≈ 1-2 Day Duration
→ ~25 truckloads / 10 cy truck Chipped
(~~≈ 15 tons~~/qtr.)
too low ≈ 100 tons/quarter

RAW DATA

SECTION 32 – WOODWORKING

Woodworking

RAH
Red House (1447)

Building Location	Shop	Controls	Description	Efficiency%	Volume of collection bin on controls	Number of times collection bin emptied in 1999	Density of sawdust (lb/ft^3) or Weight per Load	1996 Operating schedule			1999 Operating schedule		
								Hours/ day	Days/ week	Weeks/ year	Hours/ day	Days/ week	Weeks/ year
471	Zone Shop	Cyclone	Torit, Model No. 20 FB 55 w/ 3 HP motor and air filtration system. 4 filter bags (12" dia. 30" length)		55 gal			4	5	52			
8471	Vertical Wood Shop	Cyclone	5 HP (pine, fir, oak wood)		6 cy			4	5	52			
800	TMO	Cyclone	Torit Model No. 24 FB 55 w/ 7 HP motor; 4 filter bags (12"dia/8' length)		55 gal			4	5	52			
1248	Consolidated Skills Center	Cyclone	15 HP		hopper			4	3	52			
1447	Woodshop	Cyclone	Sternvent MD#CY03620 20HP 3ph 1750rpm 12ea (1'x8')		55 gal						4	3	52

Sel

800

Woodworking

Building Location	Shop	Controls	Description	Efficiency%	Volume of collection bin on controls	Number of times collection bin emptied in 1999	Density of sawdust (lb/ft^3) or Weight per Load	1996 Operating schedule			1999 Operating schedule		
								Hours/ day	Days/ week	Weeks/ year	Hours/ day	Days/ week	Weeks/ year
471	Zone Shop	Cyclone	Torit, Model No. 20 FB 55 w/ 3 HP motor and air filtration system. 4 filter bags (12" dia. 30" length)		55 gal			4	5	52			
~~8~~471	Vertical Wood Shop	Cyclone	5 HP (pine, fir, oak wood)		6 cy			4	5	52			
800	TMO	Cyclone	Torit Model No. 24 FB 55 w/ 7 HP motor; 4 filter bags (12"dia/8' length)		55 gal	3	75lbs/load	4	5	52	4	5	52
1248	Consolidated Skills Center	Cyclone	15 HP		hopper			4	3	52			

Bldg 1248

Woodworking

Redhouse (R447C)

Building Location	Shop	Controls	Description	Efficiency%	Volume of collection bin on controls	Number of times collection bin emptied in 1999	Density of sawdust (lb/ft^3) or Weight per Load	~~1996~~ 1999 Operating schedule Hours/day	Days/week	Weeks/year	~~1999~~ Future Operating schedule Hours/day	Days/week	Weeks/year
471	Zone Shop	Cyclone	Torit, Model No. 20 FB 55 w/ 3 HP motor and air filtration system. 4 filter bags (12" dia. 30" length)		55 gal			4	5	52			
8471	Vertical Wood Shop	Cyclone	5 HP (pine, fir, oak wood)		6 cy			4	5	52			
800	TMO	Cyclone	Torit Model No. 24 FB 55 w/ 7 HP motor, 4 filter bags (12"dia/8' length)		55 gal			4	5	52			
1248	Consolidated Skills Center	Cyclone	15 HP		hopper	Weekly	MWF	~~4~~ 7	3	52			
1447	Woodshop	Cyclone	Sternvent MD#CY03620 20HP 3ph 1750rpm 12ea (1'x8')		55 gal		T-Th	9	2	52	Same		
							Sat	5	1	10			

20

40 filters and cyclone

~~1 gallon ... 3 ...~~

Contact

Director: Barb Fisher-Senger 406-731-3641

Strauss

3414-028-5-040
8/1/00

Vert 471

Woodworking

Building Location	Shop	Controls	Description	Efficiency%	Volume of collection bin on controls	Number of times collection bin emptied in 1999	Density of sawdust (lb/ft^3) or Weight per Load	1996 Operating schedule			1999 Operating schedule		
								Hours/ day	Days/ week	Weeks/ year	Hours/ day	Days/ week	Weeks/ year
471	Zone Shop	Cyclone	Torit, Model No. 20 FB 55 w/ 3 HP motor and air filtration system. 4 filter bags (12" dia. 30" length)		55 gal			4	5	52			
471 8471	Vertical Wood Shop	Cyclone	No change 5 HP (pine, fir, oak wood)		OK 6 cy			OK 4	OK 5	OK 52	4	5	52
800	TMO	Cyclone	Torit Model No. 24 FB 55 w/ 7 HP motor; 4 filter bags (12"dia/8' length)		55 gal			4	5	52			
1248	Consolidated Skills Center	Cyclone	15 HP		hopper			4	3	52			

Not Found

GS

GS LT

GS 144M

RAW DATA

SECTION 33 – X-RAY PROCESSING

X-Ray Processing

1. Materials used in processing (Developer/replenisher, fixer, etc.): Kodak X-Omat Developer Replenisher Kodak X-Omat Fixer Replenisher Kodak RP X-Omat Developer Starter

2. Quantity of these materials used in 1999 : 620 gallons 550 gallons 195 gallons

X-Ray Processing

1. Materials used in processing (Developer/replenisher, fixer, etc.):

READYMATIC DENTAL CHEM PACK- 6525011680528

(2 gallons each of DEVELOPER AND FIXER PER PKG

EASTMAN KODAK - MANUFACTURER

FORMULA 2000 - 6850012565029

(TANK & TRANSPORT CLEANER TWIN PACK)

(2 Liter Bottles- Cleanser/2 Powder Packs- Activator)

AIR TECHNIQUES INC. - MANUFACTURER

SPRAY 2000 - 6520L833404R

(1 Liter Bottle each)

AIR TECHNIQUES INC. - MANUFACTURER

2. Quantity of these materials used in 1999 :

READYMATIC DENTAL CHEM PACK- 6525011680528

QUANTITY USED IN 1999 = 30 PKGS or 60 gallons

(each) Fixer & Developer

FORMULA 2000 - 6850012565029

QUANTITY USED IN 1999 = 8 Liters and 8 Powder pks

SPRAY 2000 - 6520L833404R

QUANTITY USED IN 1999 = 2 Liters

TAKE PICTURES. FURTHER.™

Material Safety Data Sheets

MSDS Product Name: KODAK RP X-OMAT Developer Replenisher

MATERIAL SAFETY DATA SHEET

200000404/F/USA
Approval Date: 07/08/1998
Print Date: 07/29/2000
Page 1

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1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: KODAK RP X-OMAT Developer Replenisher

Catalog Number(s):
124 9259 - To Make 10 gallons (U.S.)
125 5835 - To Make 10 gallons (JAPAN)
171 6828 - To Make 20 gallons (U.S.)
131 8989 - To Make 200 gallons (U.S.) - Part A
162 0509 - To Make 200 gallons (U.S.) - Parts B & C
831 7018 - To Make 5400 gallons (U.S.) - Part B
841 4161 - To Make 5400 gallons (U.S.) - Part C
851 2295 - To Make 2400 gallons (U.S.)
859 7494 - To Make 2400 gallons (U.S.)

Manufacturer/Supplier: EASTMAN KODAK COMPANY, Rochester, New York 14650

For Emergency Health, Safety & Environmental Information, call (716) 722-5151

For other information or to request an MSDS, call (800) 242-2424.

Synonym(s):
Part A: CIN 10097490, PCD 6159, C-0131.300
Part B: KAN 440512, PCD 5228, C-0131.600
Part C: KAN 440513, PCD 5250, C-0132.010
Working solution: KAN 441665, C-0133.500

---

2. COMPOSITION/INFORMATION ON INGREDIENTS

Weight % - Component - (CAS Registry No.)

Part A:

60-65	Water (007732-18-5)
20-25	Potassium sulfite (010117-38-1)
9	Hydroquinone (000123-31-9)
3	Diethylene glycol (000111-46-6)
1-5	Sodium carbonate (000497-19-8)

Part B:

75-80	Acetic acid (000064-19-7)
10-15	1-phenyl-3-pyrazolidinone (000092-43-3)
5-10	Water (007732-18-5)

Part C:

40-45	Water (007732-18-5)
40-45	Glutaraldehyde (000111-30-8)
5-10	Acetic acid (000064-19-7)

.-5 5-nitroindazole (005401-94-5)

orking solution:
85-90 Water (007732-18-5)
5-10 Potassium sulfite (010117-38-1) - non HAP
3 Hydroquinone (000123-31-9) - non HAP
1-5 Potassium acetate (000127-08-2) non-HAP
1-5 Glutaraldehyde bis(potassium bisulfite) (068310-08-7) non-HAP

Vol % wt = 85-90% = H_2O
VOC % = Ø

---

3. HAZARDS IDENTIFICATION

Part A:

CONTAINS: Hydroquinone (000123-31-9), diethylene glycol (000111-46-6), potassium sulfite (010117-38-1)
WARNING!
HARMFUL IF SWALLOWED
CAUSES EYE IRRITATION
MAY CAUSE ALLERGIC SKIN REACTION
CAN CAUSE KIDNEY DAMAGE
CAN CAUSE CNS EFFECTS

HMIS Hazard Ratings:
Health - * 2, Flammability - 1, Reactivity - 0, Personal Protection - C

NFPA Hazard Ratings:
Health - 1, Flammability - 1, Reactivity (Stability) - 0

Part B:

CONTAINS: Acetic acid (000064-19-7), 1-phenyl-3-pyrazolidinone (000092-43-3)
DANGER!
POISON
MAY BE FATAL OR HARMFUL IF SWALLOWED
VAPOR EXTREMELY IRRITATING TO THE EYES AND RESPIRATORY TRACT
CAUSES SEVERE SKIN AND EYE BURNS
MAY CAUSE ALLERGIC SKIN REACTION
COMBUSTIBLE LIQUID AND VAPOR
BASED ON REPEATED-DOSE INGESTION STUDIES IN ANIMALS, A COMPONENT OF THIS PRODUCT MAY CAUSE BLOOD, TESTICULAR, AND ADVERSE REPRODUCTIVE EFFECTS

HMIS Hazard Ratings:
Health - * 3, Flammability - 2, Reactivity - 0, Personal Protection - H

NFPA Hazard Ratings:
Health - 3, Flammability - 2, Reactivity (Stability) - 0

Part C:

CONTAINS: Glutaraldehyde (000111-30-8), acetic acid (000064-19-7)
DANGER!
CAUSES SKIN AND EYE BURNS
HARMFUL IF SWALLOWED
VAPOR EXTREMELY IRRITATING TO THE EYES AND RESPIRATORY TRACT
MAY CAUSE ALLERGIC SKIN REACTION
POTENTIAL PEROXIDE FORMER

HMIS Hazard Ratings:
Health - 3, Flammability - 1, Reactivity - 0, Personal Protection - H

NFPA Hazard Ratings:
Health - 2, Flammability - 1, Reactivity (Stability) - 0

Working solution:

TAKE PICTURES. FURTHER.™

Material Safety Data Sheets

MSDS Product Name: KODAK RP X-OMAT Developer and Replenisher

MATERIAL SAFETY DATA SHEET

200000415/F/USA
Approval Date: 09/16/1998
Print Date: 07/29/2000
Page 1

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1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: KODAK RP X-OMAT Developer and Replenisher

Catalog Number(s): 138 2845 - To Make 4 gallons (U.S.)
879 5007 - To Make 1 litre (JAPAN)

Manufacturer/Supplier: EASTMAN KODAK COMPANY, Rochester, New York 14650

For Emergency Health, Safety & Environmental Information, call (716) 722-5151

For other information or to request an MSDS, call (800) 242-2424.

Synonym(s): Part A: CIN 10097490, PCD 6159, C-0131.400
Part B: KAN 448594, PCD 5585, C-0132.940
Part C: KAN 449415, PCD 5586, C-0132.950
Working solution: KAN 966091

---

2. COMPOSITION/INFORMATION ON INGREDIENTS

Weight % - Component - (CAS Registry No.)

Part A:

60-65	Water (007732-18-5)
20-25	Potassium sulfite (010117-38-1)
9	Hydroquinone (000123-31-9)
3	Diethylene glycol (000111-46-6)
1-5	Sodium sulfite (007757-83-7)

Part B:

70-75	Acetic acid (000064-19-7)
17	Diethylene glycol (000111-46-6)
5-10	1-phenyl-3-pyrazolidinone (000092-43-3)
< 1	5-nitroindazole (005401-94-5)

Part C:

70-75	Water (007732-18-5)
10-15	Glutaraldehyde (000111-30-8)
10-15	Sodium bromide (007647-15-6)

Working solution:

85-90	Water (007732-18-5)
5-10	Potassium sulfite (010117-38-1)
1-5	Hydroquinone (000123-31-9)
1-5	Diethylene glycol (000111-46-6)

TAKE PICTURES. FURTHER.™

Material Safety Data Sheets

MSDS Product Name: KODAK RP X-OMAT Developer Starter

MATERIAL SAFETY DATA SHEET

200000420/F/USA
Approval Date: 02/04/1998
Print Date: 07/29/2000
Page 1

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1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: KODAK RP X-OMAT Developer Starter

Catalog Number(s): 133 2642 - To Make 8 gallon (U.S.)
835 7931 - To Make 8 gallon (U.S.)

Manufacturer/Supplier: EASTMAN KODAK COMPANY, Rochester, New York 14650

For Emergency Health, Safety & Environmental Information, call (716) 722-5151

For other information or to request an MSDS, call (800) 242-2424.

Synonym(s): KAN 449513, PCD 5607, C-0134.100

---

2. COMPOSITION/INFORMATION ON INGREDIENTS

Weight %	Component - (CAS Registry No.)	
85-90	Water (007732-18-5)	Non-HAP
10-15	Sodium bromide (007647-15-6)	Non-HAP
< 1	Polymeric glycol (025322-68-3)	(2) Non-HAP
< 1	Cationic surfactant (000121-54-0)	Non-HAP

wt % VOC = 85-90% (H_2O)
Ø VOC

---

3. HAZARDS IDENTIFICATION

LOW HAZARD FOR RECOMMENDED HANDLING

Eastman Kodak Hazard Ratings: R-1, S-1, F-0, C-0

HMIS Hazard Ratings:
Health - 0 , Flammability - 0, Reactivity - 0, Personal Protection - A

NFPA Hazard Ratings:
Health - 0, Flammability - 0, Reactivity (Stability) - 0

NOTE: HMIS and NFPA hazard indexes involve data review and interpretation that may vary among companies. They are intended only for rapid, general identification of the magnitude of the potential hazards. The personal protection index is only intended for general guidance on personal protection equipment (PPE) that is suitable for the potential hazards of the material. PPE (e.g., respirators) may not be needed if engineering controls (e.g., local ventilation) are adequate. An asterisk (*), in the HMIS health field, designates potential chronic or target organ hazards. To adequately address safe handling, ALL information in this MSDS must be considered.

---

4. FIRST-AID MEASURES

Inhalation: If symptomatic, move to fresh air. Treat symptomatically. Get medical attention if symptoms persist.

Eyes: Any material that contacts the eye should be washed out immediately with water. Get medical attention if symptoms occur.

Skin: Wash with soap and water. Get medical attention if symptoms occur.

Ingestion: Drink 1-2 glasses of water. Seek medical attention. Never give anything by mouth to an unconscious person.

---

5. FIRE FIGHTING MEASURES

Extinguishing Media: Use appropriate agent for adjacent fire.

Special Fire-Fighting Procedures: Wear self-contained breathing apparatus and protective clothing. Fire or excessive heat may produce hazardous decomposition products.

Hazardous Combustion Products: None (noncombustible), (see also Hazardous Decomposition Products section)

Unusual Fire and Explosion Hazards: None

---

6. ACCIDENTAL RELEASE MEASURES

Flush to sewer with large amounts of water. Otherwise, absorb spill with vermiculite or other inert material, then place in a container for chemical waste. Clean surface thoroughly to remove residual contamination.

---

7. HANDLING AND STORAGE

Personal Precautionary Measures: Use with adequate ventilation. Wash thoroughly after handling.

Prevention of Fire and Explosion: No special precautionary measures should be needed under anticipated conditions of use.

Storage: Keep container closed.

---

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Limits:

Ventilation: Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions.

Respiratory Protection: None should be needed.

Eye Protection: It is a good industrial hygiene practice to minimize eye contact. Wear safety glasses with side shields (or goggles).

Skin Protection: It is a good industrial hygiene practice to minimize skin contact. For operations where prolonged or repeated skin contact may occur, impervious gloves should be worn.

Recommended Decontamination Facilities: Eye bath, washing facilities, safety shower

---

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical Form: Liquid
Color: Colorless
Odor: Odorless
Specific Gravity (water = 1): 1.106
Vapor Pressure at 20°C (68°F): 24 mbar (18 mm Hg)
Vapor Density (Air = 1): 0.6
Volatile Fraction by Weight: 85-90 %
Boiling Point: >100°C (>212°F)
Solubility in Water: Complete
pH: 6.6
Flash Point: None, noncombustible liquid

---

10. STABILITY AND REACTIVITY

Stability: Stable

Incompatibility: None with common materials and contaminants with which the material may reasonably come into contact.

Hazardous Decomposition Products: Hydrogen bromide

Hazardous Polymerization: Will not occur.

---

11. TOXICOLOGICAL INFORMATION

Effects of Exposure:

Inhalation: Expected to be a low hazard for recommended handling.
Eyes: No specific hazard known. May cause transient irritation.

Skin: Low hazard for recommended handling.

Ingestion: Expected to be a low ingestion hazard.

---

12. ECOLOGICAL INFORMATION

Introduction: This environmental effects summary is written to assist in addressing emergencies created by an accidental spill which might occur during the shipment of this material, and, in general, it is not meant to address discharges to sanitary sewers or publically owned treatment works.

Summary: Data for the major components of this material have been used to estimate the environmental impact of this material. However, this material, itself, has not been tested for environmental effects.

It is expected to have the following properties: No biochemical oxygen demand and no potential to cause oxygen depletion in aqueous systems, a low potential to affect aquatic organisms, a low potential to affect secondary waste treatment microbial metabolism, a low potential to affect the germination and/or early growth of some plants, a low potential to bioconcentrate. After dilution with a large amount of water, followed by secondary waste treatment, this material is not expected to cause adverse environmental effects.

---

13. DISPOSAL CONSIDERATIONS

Discharge, treatment, or disposal may be subject to national, state, or local laws. Flush to sewer with large amounts of water.

---

14. TRANSPORT INFORMATION

- For transportation information regarding this product call the Kodak Worldwide Transportation Hazmat Hot Line: (716) 722-2400 between 8 a.m. and 5 p.m. (Eastern Standard Time), Monday through Friday.

United Nations

UN Number:

---

15. REGULATORY INFORMATION

- Material(s) known to the State of California to cause cancer: None
- Material(s) known to the State of California to cause adverse reproductive effects: None
- Carcinogenicity Classification (components present at 0.1% or more):
  - International Agency for Research on Cancer (IARC): None
  - American Conference of Governmental Industrial Hygienists (ACGIH): None
  - National Toxicology Program (NTP): None
  - Occupational Safety and Health Administration (OSHA): None

- Chemical(s) subject to the reporting requirements of Section 313 or Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986 and 40 CFR Part 372: None

---

16. OTHER INFORMATION

US/Canadian Label Statements:

LOW HAZARD FOR RECOMMENDED HANDLING

Keep out of reach of children.

For additional information, see Material Safety Data Sheet (MSDS) for this material.

The information contained herein is furnished without warranty of any kind. Users should consider these data only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use and disposal of these materials and the safety and health of employees and customers and the protection of the environment.

R-1, S-1, F-0, C-0

Health - 1, Flammability - 0, Reactivity (Stability) - 0

NOTE: HMIS and NFPA hazard indexes involve data review and interpretation that may vary among companies. They are intended only for rapid, general identification of the magnitude of the potential hazards. The personal protection index is only intended for general guidance on personal protection equipment (PPE) that is suitable for the potential hazards of the material. PPE (e.g., respirators) may not be needed if engineering controls (e.g., local ventilation) are adequate. An asterisk (*), in the HMIS health field, designates potential chronic or target organ hazards. To adequately address safe handling, ALL information in this MSDS must be considered.

---

4. FIRST-AID MEASURES

Inhalation: If symptomatic, move to fresh air. Treat symptomatically. Get medical attention if symptoms persist.

Eyes: Immediately flush with plenty of water for at least 15 minutes. Get medical attention if symptoms occur.

Skin: Immediately flush with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. If skin irritation or an allergic skin reaction develops, get medical attention. Wash contaminated clothing before reuse. Destroy or thoroughly clean contaminated shoes.

Ingestion: Only induce vomiting at the instruction of medical personnel. Drink 1-2 glasses of water. Never give anything by mouth to an unconscious person. Call a physician or poison control center immediately.

---

5. FIRE FIGHTING MEASURES

Extinguishing Media: Use appropriate agent for adjacent fire.

Special Fire-Fighting Procedures: Wear self-contained breathing apparatus and protective clothing.

Hazardous Combustion Products: None (noncombustible).

Unusual Fire and Explosion Hazards: None

---

6. ACCIDENTAL RELEASE MEASURES

Flush to sewer with large amounts of water.

---

7. HANDLING AND STORAGE

Personal Precautionary Measures: Avoid breathing mist or vapor. Avoid contact with eyes, skin, and clothing. Use with adequate ventilation. Wash thoroughly after handling.
Prevention of Fire and Explosion: No special precautionary measures should be needed under anticipated conditions of use.

Storage: Keep container closed.

---

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Limits:

ACGIH Threshold Limit Value (TLV):

Hydroquinone: 2 mg/m3 TWA

OSHA (USA) Permissible Exposure Limit (PEL - 1971 Table Z-1 Values):

Hydroquinone: 2 mg/m3 TWA

Ventilation: Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions.

Respiratory Protection: None should be needed. A respirator should be worn if hazardous decomposition products are likely to be or have been released. Respirator type: Acid gas. See Stability and Reactivity Section. If respirators are used, a program should be instituted to assure compliance with OSHA Standard 29 CFR 1910.134.

Eye Protection: It is a good industrial hygiene practice to minimize eye contact. Wear safety glasses with side shields (or goggles).

Skin Protection: It is a good industrial hygiene practice to minimize skin contact. Wear impervious gloves and protective clothing appropriate for the risk of exposure.

Recommended Decontamination Facilities: Eye bath, washing facilities, safety shower

---

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical Form: Liquid
Color: Colorless
Odor: Odorless
Specific Gravity (water = 1): 1.08
Vapor Pressure at 20°C (68°F): 24 mbar (18 mm Hg)
Vapor Density (Air = 1): 0.6
Volatile Fraction by Weight: 90 %
Boiling Point: >100°C (>212°F)
Solubility in Water: Complete
pH: 10.1
Flash Point: None, noncombustible liquid

---

10. STABILITY AND REACTIVITY

Stability: Stable

Incompatibility: None with common materials and contaminants with which the material may reasonably come into contact.

Hazardous Polymerization: Will not occur.

---

11. TOXICOLOGICAL INFORMATION

Effects of Exposure:

General: Contains Hydroquinone. In F-344 rats, chronic oral administration of hydroquinone has resulted in the formation of benign kidney tumors thought to be secondary to nephropathy. Hydroquinone-induced nephropathy following oral administration has been noted in the male F-344 rat, but not in other species or rat strains tested. Although an increase in mononuclear cell leukemia in F-344 female rats has been reported following chronic oral

administration of hydroquinone, this finding was not reproduced in a subsequent study. There was no evidence of carcinogenicity in male mice following chronic oral administration of hydroquinone; some evidence of carcinogenic activity was shown in female mice by an increase in hepatocellular neoplasms which were primarily benign adenomas, although this finding was not reproduced in a subsequent study. No skin tumors were reported in mice following long-term dermal application of hydroquinone. Therefore, neoplastic responses have not been consistent across route of exposure, species, or sex. Hydroquinone is generally negative in bacterial mutagenicity tests; there is evidence for the clastogenicity (chromosome breakage) of hydroquinone in vivo and in vitro. The relevance of the chromosomal effects in test animals in predicting human risk is unclear.

Inhalation: Expected to be a low hazard for usual industrial or commercial handling by trained personnel. In contact with strong acids or if heated, sulfites may liberate sulfur dioxide gas. Sulfur dioxide gas is irritating to the respiratory tract. Some asthmatics or hypersensitive individuals may experience difficult breathing.

Eyes: Causes irritation.

Skin: May cause allergic skin reaction based on human experience. May cause skin depigmentation. Prolonged or repeated contact with aqueous solutions may cause irritation.

Ingestion: Harmful if swallowed.

---

12. ECOLOGICAL INFORMATION

The following properties are ESTIMATED from the components of the preparations:.

Potential Toxicity

Fish LC50 mg/l:	1-10
Daphnid EC50 mg/l:	1-10
Algal IC50 mg/l:	10-100

Organics Readily Degradable (>70%):	Yes (7 days)
Potential Bioaccumulation:	Log Pow <1
COD (approximate g/l):	60
BOD5 (approximate g/l):	40
Potential Toxicity Waste treatment microorganisms EC50 (mg/l):	Not available

---

13. DISPOSAL CONSIDERATIONS

Discharge, treatment, or disposal may be subject to national, state, or local laws. Flush to sewer with large amounts of water.

Since emptied containers retain product residue, follow label warnings even after container is emptied.

---

14. TRANSPORT INFORMATION

For transportation information regarding this product call the Kodak Worldwide Transportation Hazmat Hot Line: (716) 722-2400 between 8 a.m. and 5 p.m. (Eastern Standard Time), Monday through Friday.

---

15. REGULATORY INFORMATION

- Material(s) known to the State of California to cause cancer: None
- Material(s) known to the State of California to cause adverse reproductive effects: None

- Carcinogenicity Classification (components present at 0.1% or more):
  - International Agency for Research on Cancer (IARC): None
  - American Conference of Governmental Industrial Hygienists (ACGIH): Hydroquinone; A3, animal carcinogen.
  - National Toxicology Program (NTP): None
  - Occupational Safety and Health Administration (OSHA): None

- Chemical(s) subject to the reporting requirements of Section 313 or Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986 and 40 CFR Part 372: Hydroquinone

---

16. OTHER INFORMATION

US/Canadian Label Statements:

CONTAINS: Hydroquinone (000123-31-9), Sodium sulfite (007757-83-7), 4-hydroxymethyl-4-methyl-1-phenyl-3-pyrazolidinone (013047-13-7)
WARNING!
HARMFUL IF SWALLOWED
CAUSES EYE IRRITATION
MAY CAUSE ALLERGIC SKIN REACTION

Avoid breathing mist or vapor.
Avoid contact with eyes, skin, and clothing.
Use with adequate ventilation.
Wash thoroughly after handling.

FIRST AID: If swallowed, only induce vomiting as directed by medical personnel. Never give anything by mouth to an unconscious person. Call a physician or poison control center immediately. In case of contact, immediately flush eyes and skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention if symptoms occur. Wash contaminated clothing before reuse. Destroy or thoroughly clean contaminated shoes.

Since emptied containers retain product residue, follow label warnings even after container is emptied.

Keep out of reach of children.

For additional information, see Material Safety Data Sheet (MSDS) for this material.

R-1, S-2, F-0, C-0

AIR
TECHNIQUES

MATERIAL SAFETY DATA SHEET

SECTION 1 - PRODUCT IDENTIFICATION AND USE

PRODUCT IDENTIFIER ➔SPRAY 2000	PRODUCT IDENTIFICATION NUMBER (PIN) SPRAY 2000
PRODUCT USE ➔Spray 2000 is a special spray cleaner for the roller assemblies (transfer roller/racks) in automatic X-ray developers, e.g. A/T 2000, A/T 2000 PLUS or PERI-PRO.	

MANUFACTURER'S NAME Air Techniques, Inc.		SUPPLIER'S NAME Air Techniques, Inc.	
STREET ADDRESS 70 Cantiague Rock Road		STREET ADDRESS 70 Cantiague Rock Road	
CITY Hicksville	PROVINCE NY	CITY Hicksville	PROVINCE NY
POSTAL CODE USA - 11801	EMERGENCY TELEPHONE NO. USA/516/433-7676	POSTAL CODE USA - 11801	EMERGENCY TELEPHONE NO. USA/516/433-7676

SECTION 2 - HAZARDOUS INGREDIENTS

HAZARDOUS INGREDIENTS	%	CAS NUMBER	LD_{50} OF INGREDIENT (SPECIFY SPECIES AND ROUTE)	LD_{50} OF INGREDIENT (SPECIFY SPECIES)
Sodium hydoxide	< 1	1310-73-2	40 mg/kg (mouse, oral)	N/A
		Non-Haz		

SECTION 3 - PHYSICAL DATA

PHYSICAL STATE liquid	ODOUR AND APPEARANCE clear colourless and odourless liquid			ODOUR THRESHOLD (ppm) N/A
VAPOUR PRESSURE (mm Hg) like water	VAPOUR DENSITY (AIR = 1) like water	EVAPORATION RATE like water	BOILING POINT (° C) approx. 100 °C	FREEZING POINT (° C) approx. 0 °C
pH 11.8	SPECIFIC GRAVITY 1.0 g/cm³	COEFF. WATER/OIL DIST. N/A		

SECTION 4 - FIRE AND EXPLOSION DATA

FLAMMABILITY
YES ☐ NO ☒ IF YES, UNDER WHICH CONDITIONS ? ➔

MEANS OF EXTINCTION
No fire or explosion hazards come from the product itself.
Fire-fighters should wear self-contained breathing apparatus.

FLASHPOINT (° C) AND METHOD none	UPPER FLAMMABLE LIMIT (% BY VOLUME) -	LOWER FLAMMABLE LIMIT (% BY VOLUME) -
AUTOIGNITON TEMPERATURE (° C) N/A	HAZARDOUS COMBUSTION PRODUCTS -	
EXPLOSION DATA ➔	SENSITIVITY TO IMPACT N/A	SENSITIVITY TO STATIC DISCHARGE -

SECTION 5 - REACTIVITY DATA

CHEMICAL STABILITY
YES ☒ NO ☐ IF YES, UNDER WHICH CONDITIONS ? ➔

INCOMPATIBILITY WITH OTHER SUBSTANCES
YES ☒ NO ☐ IF SO, WHICH ONES ? ➔Acid products

REACTIVITY, AND UNDER WHAT CONDITIONS
-

HAZARDOUS DECOMPOSITION PRODUCTS
-

PRODUCT IDENTIFIER → **SPRAY 2000**

SECTION 6 - TOXICOLOGICAL PROPERTIES

ROUTE OF ENTRY

SKIN CONTACT ☒ SKIN ABSORPTION ☐ EYE CONTACT ☒ INHALATION ☐ INGESTION ☒

EFFECTS OF ACUTE EXPOSURE TO PRODUCT

Inhalation:	May cause irritation to mucous membranes and respiratory tract.
Skin contact:	May cause irritation.
Eye contact:	May cause irritation.
Ingestion:	May be harmful if swallowed.

EFFECTS OF CHRONIC EXPOSURE TO PRODUCT

N/A

EXPOSURE LIMITS	IRRITANCY OF PRODUCT	SENSITIZATION TO PRODUCT	CARCINOGENICITY
not known	Skin and eye contact	none	none
TERATOGENICITY	REPRODUCTIVE TOXICITY	MUTAGENICITY	SYNERGISTIC PRODUCTS
N/A	none	N/A	N/A

SECTION 7 - PREVENTIVE MEASURES

PERSONAL PROTECTIVE EQUIPMENT

GLOVES (SPECIFY)	RESPIRATOR (SPECIFY)	EYE (SPECIFY)
-	-	-
FOOTWEAR (SPECIFY)	CLOTHING (SPECIFY)	OTHER (SPECIFY)
-	-	-

ENGINEERING CONTROLS (SPECIFY, EG. VENTILATION, ENCLOSED PROCESS)

-

LEAK AND SPILL PROCEDUR

Dilute with plenty of water and flush down sewer.

WASTE DISPOSAL

No specific methods are necessary.

HANDLING PROCEDURES AND EQUIPMENT

Avoid contact with eyes or skin and inhalation.

STORAGE REQUIREMENTS

Product to be cold-stored, however, not below 5 °C.

SPECIAL SHIPPING INFORMATION

According to the valid transportation classification: No dangerous cargo.

SECTION 8 - FIRST AID MEASURES

SPECIFIC MEASURES

Inhalation:	Remove victim to fresh air. No special measures required.
Skin contact:	Rinse with copious amounts of water.
Eye contact:	Flush with large amounts of water and consult a physician.
Ingestion:	Let person concerned drink 500 mL of water immediately and consult a physician.

SECTION 9 - PREPARATION DATE OF MSDS

PREPARED BY (GROUP, DEPARTMENT, ETC.)	PHONE NUMBER	DATE
FILM PROCESSOR DEPARTMENT	USA/516/433-7676	2000-05-08

Kodak TAKE PICTURES. FURTHER.™

Material Safety Data Sheets

MSDS Product Name: KODAK READYMATIC Dental Developer and Replenisher

MATERIAL SAFETY DATA SHEET

000003341/F/USA
Approval Date: 02/09/2000
Print Date: 07/29/2000
Page 1

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1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: KODAK READYMATIC Dental Developer and Replenisher

Catalog Number(s):
102 8869 - 2 X 1 - gallon (U.S.) Ready-To-Use - (Chem Pack)
877 7534 - 4 X 1 gallon (U.S.) Ready-To-Use
856 1599 - 2 X 1 gallon Ready-To-Use - (Chem Pack) (JAPAN)

Manufacturer/Supplier: EASTMAN KODAK COMPANY, Rochester, New York 14650

For Emergency Health, Safety & Environmental Information, call (716) 722-5151

For other information or to request an MSDS, call (800) 242-2424.

Synonym(s): CIN 10081483; PCD 6135; C-0124.050

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2. COMPOSITION/INFORMATION ON INGREDIENTS

Weight % - Component - (CAS Registry No.)

.90 % Vol By wt
Assume 5% VOC other than H_2O

Weight %		Component (CAS Registry No.)	
85-90		Water (007732-18-5)	- Non-HAP
1-5	no VOC	Sodium sulfite (007757-83-7)	- Non-HAP
2		Hydroquinone (000123-31-9)	- HAP
1-5		Sodium bicarbonate (000144-55-8)	- Non-HAP
< 1	No VOC	Potassium carbonate (000584-08-7)	- Non-HAP
< 1		4-hydroxymethyl-4-methyl-1-phenyl-3-pyrazolidinone (013047-13-7)	- Non-HAP

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3. HAZARDS IDENTIFICATION

CONTAINS: Hydroquinone (000123-31-9), Sodium sulfite (007757-83-7), 4-hydroxymethyl-4-methyl-1-phenyl-3-pyrazolidinone (013047-13-7)
WARNING!
HARMFUL IF SWALLOWED
CAUSES EYE IRRITATION
MAY CAUSE ALLERGIC SKIN REACTION

HMIS Hazard Ratings:
Health - 2 , Flammability - 0, Reactivity - 0, Personal Protection - C

NFPA Hazard Ratings:

MSDS Product Name: KODAK READYMATIC Dental Fixer and Replenisher

MATERIAL SAFETY DATA SHEET

200000597/F/USA
Approval Date: 01/14/1998
Print Date: 07/29/2000
Page 1

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1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: KODAK READYMATIC Dental Fixer and Replenisher

Catalog Number(s):
102 8869 - 2 X 1 gallon (U.S.) Ready-To-Use - (Chem Pack)
871 2879 - 4 X 1 gallon (U.S.) Ready-To-Use
856 1599 - 2 X 1 gallon Ready-To-Use - (Chem Pack) (JAPAN)

Manufacturer/Supplier: EASTMAN KODAK COMPANY, Rochester, New York 14650

For Emergency Health, Safety & Environmental Information, call (716) 722-5151

For other information or to request an MSDS, call (800) 242-2424.

Synonym(s): KAN 427772; PCD 4856; D-0021.000

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2. COMPOSITION/INFORMATION ON INGREDIENTS

Weight % - Component - (CAS Registry No.)

85% VOC By wt.

80-85	Water (007732-18-5)
14	Ammonium thiosulfate (007783-18-8) non-HAP
1-5	Acetic acid (000064-19-7) VOC non-HAP
< 1	Ammonium sulfite (010196-04-0) non-HAP
< 1	Aluminum sulfate (010043-01-3) Non-HAP

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3. HAZARDS IDENTIFICATION

CONTAINS: Ammonium sulfite (010196-04-0)
WARNING!
MAY BE HARMFUL IF SWALLOWED

HMIS Hazard Ratings:
Health - 1 , Flammability - 0, Reactivity - 0, Personal Protection - B

NFPA Hazard Ratings:
Health - 1, Flammability - 0, Reactivity (Stability) - 0

NOTE: HMIS and NFPA hazard indexes involve data review and interpretation that may vary among companies. They are intended only for rapid, general

TECHNIQUES

MATERIAL SAFETY DATA SHEET

SECTION 1 - PRODUCT IDENTIFICATION AND USE

PRODUCT IDENTIFIER → FORMULA 2000 – component 1

PRODUCT IDENTIFICATION NUMBER (PIN) Formula 2000 – comp. 1

PRODUCT USE → FORMULA 2000 is a special cleaning agent for the removal of oxidization and reduction products from X-ray film developers.

MANUFACTURER'S NAME Air Techniques, Inc.		SUPPLIER'S NAME Air Techniques, Inc.	
STREET ADDRESS 70 Cantiague Rock Road		STREET ADDRESS 70 Cantiague Rock Road	
CITY Hicksville	PROVINCE NY	CITY Hicksville	PROVINCE NY
POSTAL CODE USA - 11801	EMERGENCY TELEPHONE NO. USA/516/433-7676	POSTAL CODE USA - 11801	EMERGENCY TELEPHONE NO. USA/516/433-7676

SECTION 2 - HAZARDOUS INGREDIENTS

HAZARDOUS INGREDIENTS	%	CAS NUMBER	LD_{50} OF INGREDIENT (SPECIFY SPECIES AND ROUTE)	LD_{50} OF INGREDIENT (SPECIFY SPECIES)
Non-HAP Nitric acid	5 - 10	7697-37-2	430 mg/kg (human, oral)	67 ppm (NO_2)/4 h
Non-HAP Thiourea	1 - 5	62-56-6	1750 mg/kg (rat, oral)	> 170 mg/m³/4 h (rat)

SECTION 3 - PHYSICAL DATA

PHYSICAL STATE liquid	ODOUR AND APPEARANCE clear colourless liquid of slight odor			ODOUR THRESHOLD (ppm) N/A
VAPOUR PRESSURE (mm Hg) like water	VAPOUR DENSITY (AIR = 1) N/A	EVAPORATION RATE like water	BOILING POINT (° C) approx. 100 °C	FREEZING POINT (° C) approx. – 5 °C
pH < 1	SPECIFIC GRAVITY 1.05 g/cm³	COEFF. WATER/OIL DIST. N/A		

SECTION 4 - FIRE AND EXPLOSION DATA

FLAMMABILITY
YES ☐ NO ☒ IF YES, UNDER WHICH CONDITIONS ? →

MEANS OF EXTINCTION
No fire or explosion hazards come from the product itself.
Fire-fighters should wear self-contained breathing apparatus. Extensive heat may cause hazardous decomposition products.

FLASHPOINT (° C) AND METHOD none	UPPER FLAMMABLE LIMIT (% BY VOLUME) -	LOWER FLAMMABLE LIMIT (% BY VOLUME) -
AUTOIGNITON TEMPERATURE (° C) N/A	HAZARDOUS COMBUSTION PRODUCTS Nitrous fumes, sulphur dioxide	
EXPLOSION DATA → SENSITIVITY TO IMPACT N/A	SENSITIVITY TO STATIC DISCHARGE -	

SECTION 5 - REACTIVITY DATA

CHEMICAL STABILITY
YES ☒ NO ☐ IF YES, UNDER WHICH CONDITIONS ? →

INCOMPATIBILITY WITH OTHER SUBSTANCES
YES ☒ NO ☐ IF SO, WHICH ONES ? → Alcaline products

REACTIVITY, AND UNDER WHAT CONDITIONS
Slightly oxidative

HAZARDOUS DECOMPOSITION PRODUCTS
Nitrous fumes

AIR
TECHNIQUES

M.S.D.S. PAGE

PRODUCT IDENTIFIER → **FORMULA 2000 – component 1**

SECTION 6 - TOXICOLOGICAL PROPERTIES

ROUTE OF ENTRY

SKIN CONTACT ☒ SKIN ABSORPTION ☐ EYE CONTACT ☒ INHALATION ☐ INGESTION ☒

EFFECTS OF ACUTE EXPOSURE TO PRODUCT

Inhalation:	May cause irritation to nasal mucousmembranes and respiratory tract.
Skin contact:	Irritation to skin.
Eye contact:	Corrosive on eyes.
Ingestion:	Harmful and corrosive if swallowed.

EFFECTS OF CHRONIC EXPOSURE TO PRODUCT
N/A

EXPOSURE LIMITS	IRRITANCY OF PRODUCT	SENSITIZATION TO PRODUCT	CARCINOGENICITY
not known	Skin, eye and ingestion possible	none	N/A
TERATOGENICITY	**REPRODUCTIVE TOXICITY**	**MUTAGENICITY**	**SYNERGISTIC PRODUCTS**
N/A	N/A	N/A	N/A

SECTION 7 - PREVENTIVE MEASURES

PERSONAL PROTECTIVE EQUIPMENT

GLOVES (SPECIFY)	RESPIRATOR (SPECIFY)	EYE (SPECIFY)
Nitrile, rubber or plastic	Use NIOSH approved cartridge respirator in poorly ventilated rooms.	Safety goggles
FOOTWEAR (SPECIFY)	**CLOTHING (SPECIFY)**	**OTHER (SPECIFY)**
Lace-up shoes	Protective clothing to avoid skin contact.	-

ENGINEERING CONTROLS (SPECIFY, EG. VENTILATION, ENCLOSED PROCESS)
-

LEAK AND SPILL PROCEDUR
Prevent product from entering water supplies and sewerage. Dilute spilled or released liquid wuth plenty of water and soak up with suitable absorbent material and dispose of in accordance with local environmental codes.

WASTE DISPOSAL
No specific methods are necessary. Disposal mut conform to Federal or local regulations. Request permission of local sewer authority.

HANDLING PROCEDURES AND EQUIPMENT
Do not breathe in the vapors. Use only in adequately ventilated rooms. Please observe instructions for use before application.

STORAGE REQUIREMENTS
Product to be cold-stored, however, not below 5 °C.

SPECIAL SHIPPING INFORMATION
UN 1760, CORROSIVE LIQUID, N.O.S. (contains less than 10 % nitric acid
IMDG Code Class 8, Page 8147, EmS 8-15, MFAG 760 – ADR/RID Class 8, 66 c

SECTION 8 - FIRST AID MEASURES

SPECIFIC MEASURES

Inhalation:	In the event of trouble in breathing, let person concerned leave the room and breathe in fresh air.
Skin contact:	Wash with plenty of water.
Eye contact:	Flush with large amounts of water and consult a physician.
Ingestion:	When product is swallowed, drink 500 mL of water and consult a physician.

SECTION 9 - PREPARATION DATE OF MSDS

PREPARED BY (GROUP, DEPARTMENT, ETC.)	PHONE NUMBER	DATE
FILM PROCESSOR DEPARTMENT	USA/516/433-7676	2000-01-24

TECHNIQUES

MATERIAL SAFETY DATA SHEET

SECTION 1 - PRODUCT IDENTIFICATION AND USE

PRODUCT IDENTIFIER → **FORMULA 2000 – component 2**

PRODUCT IDENTIFICATION NUMBER (PIN) Formula 2000 – comp. 2

PRODUCT USE → FORMULA 2000 is a special cleaning agent for the removal of oxidization and reduction products from X-ray film developers.

MANUFACTURER'S NAME		SUPPLIER'S NAME	
Air Techniques, Inc.		Air Techniques, Inc.	
STREET ADDRESS: 70 Cantiague Rock Road		STREET ADDRESS: 70 Cantiague Rock Road	
CITY: Hicksville	PROVINCE: NY	CITY: Hicksville	PROVINCE: NY
POSTAL CODE: USA - 11801	EMERGENCY TELEPHONE NO.: USA/516/433-7676	POSTAL CODE: USA - 11801	EMERGENCY TELEPHONE NO.: USA/516/433-7676

SECTION 2 - HAZARDOUS INGREDIENTS

HAZARDOUS INGREDIENTS	%	CAS NUMBER	LD_{50} OF INGREDIENT (SPECIFY SPECIES AND ROUTE)	LD_{50} OF INGREDIENT (SPECIFY SPECIES
Sodiumperoxodisulphate	50	7775-27-1 775-27-1	1000 mg/kg (rat, oral)	N/A

Non HAP
mw=238.0977
$Na_2O_8S_2$
↓
Assume Non-VOC
melt pt 100°C

SECTION 3 - PHYSICAL DATA

PHYSICAL STATE	ODOUR AND APPEARANCE			ODOUR THRESHOLD (ppm)
solid	white, odorless powder			N/A
VAPOUR PRESSURE (mm Hg): -	VAPOUR DENSITY (AIR = 1): -	EVAPORATION RATE: -	BOILING POINT (° C): -	FREEZING POINT (° C): -
pH: -	SPECIFIC GRAVITY: -	COEFF. WATER/OIL DIST.: -		

SECTION 4 - FIRE AND EXPLOSION DATA

FLAMMABILITY
YES ☒ NO ☐ IF YES, UNDER WHICH CONDITIONS ? →Fire hazard when contacted with inflammable materials.

MEANS OF EXTINCTION
In case of fire use water.
Keep away from combustible materials.

FLASHPOINT (° C) AND METHOD	UPPER FLAMMABLE LIMIT (% BY VOLUME)	LOWER FLAMMABLE LIMIT (% BY VOLUME)
- (not applicable)	-	-
AUTOIGNITON TEMPERATURE (° C): - (not applicable)	HAZARDOUS COMBUSTION PRODUCTS: Sulphur dioxide, sulphur trioxide, ozone	

EXPLOSION DATA → SENSITIVITY TO IMPACT: - SENSITIVITY TO STATIC DISCHARGE: -

SECTION 5 - REACTIVITY DATA

CHEMICAL STABILITY
YES ☐ NO ☒ IF YES, UNDER WHICH CONDITIONS ? →Concentrated aqueous solutions of sodiumpersulphate decompose at 60 °C und development of oxygen.

INCOMPATIBILITY WITH OTHER SUBSTANCES
YES ☒ NO ☐ IF SO, WHICH ONES ? →Keep away from combustible materials, leaches, alkalies

REACTIVITY, AND UNDER WHAT CONDITIONS
Decomposition takes place under the action of heat (> 180 °C).

HAZARDOUS DECOMPOSITION PRODUCTS
Slightly development of sulphur trioxide and ozone under the action of heat.

AIR
TECHNIQUES

M.S.D.S. PAGE

PRODUCT IDENTIFIER → **FORMULA 2000 – component 2**

SECTION 6 - TOXICOLOGICAL PROPERTIES

ROUTE OF ENTRY

SKIN CONTACT ☒ SKIN ABSORPTION ☐ EYE CONTACT ☒ INHALATION ☐ INGESTION ☒

EFFECTS OF ACUTE EXPOSURE TO PRODUCT

Inhalation:	May cause sensitization by inhalation.
Skin contact:	May cause sensitization by skin contact.
Eye contact:	May cause slight eye irritation.
Ingestion:	May be harmful if swallowed.

EFFECTS OF CHRONIC EXPOSURE TO PRODUCT
N/A

EXPOSURE LIMITS not known	IRRITANCY OF PRODUCT Slight eye irritation is possible.	SENSITIZATION TO PRODUCT Sensitization is possible with skin contact or by inhalation.	CARCINOGENICITY N/A
TERATOGENICITY N/A	REPRODUCTIVE TOXICITY N/A	MUTAGENICITY N/A	SYNERGISTIC PRODUCTS N/A

SECTION 7 - PREVENTIVE MEASURES

PERSONAL PROTECTIVE EQUIPMENT

GLOVES (SPECIFY) Nitrile, rubber or plastic	RESPIRATOR (SPECIFY) -	EYE (SPECIFY) Safety goggles
FOOTWEAR (SPECIFY) Lace-up shoes	CLOTHING (SPECIFY) Protective clothing to avoid skin contact.	OTHER (SPECIFY) -

ENGINEERING CONTROLS (SPECIFY, EG. VENTILATION, ENCLOSED PROCESS)
-

LEAK AND SPILL PROCEDUR
Prevent product from entering water supplies and sewerage. Dilute spilled or released liquid with plenty of water and dispose of in accordance with local environmental codes.

WASTE DISPOSAL
No specific methods are necessary. Disposal must conform to Federal or local regulations. Request permission of local sewer authority.

HANDLING PROCEDURES AND EQUIPMENT
Do not breathe dust. Use only in adequately ventilated rooms. Avoid contact with eyes and skin or ingestion. Please observe instructions for use before application.

STORAGE REQUIREMENTS
Store product in a cool dry place, protect from heat and humidity.

SPECIAL SHIPPING INFORMATION
see FORMULA 2000 - component 1 – FORMULA 2000 component 1 and 2 are a packing unit.

SECTION 8 - FIRST AID MEASURES

SPECIFIC MEASURES

Inhalation:	In the event of trouble in breathing, let person concerned leave the room and breathe in fresh air.
Skin contact:	Wash with plenty of water.
Eye contact:	Flush with large amounts of water and consult a physician.
Ingestion:	When product is swallowed, drink 500 mL of water and consult a physician.

SECTION 9 - PREPARATION DATE OF MSDS

PREPARED BY (GROUP, DEPARTMENT, ETC.)	PHONE NUMBER	DATE
FILM PROCESSOR DEPARTMENT	USA/516/433-7676	2000-01-24

AFIERA/DOBP (STINFO)
2513 KENNEDY CIRCLE
BROOKS AFB TX 78235-5123

OFFICIAL BUSINESS